Darwin Initiative – Final Report

*(To be completed with reference to the Reporting Guidance Notes for Project Leaders (http://darwin.defra.gov.uk/resources/) it is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)*

Darwin project information

Project Reference	17-002
Project Title	Managing coral reef fisheries for biodiversity, ecosystem and economic benefits
Host country(ies)	Maldives
UK Contract Holder Institution	Marine Conservation Society
UK Partner Institution(s)	Marine Research Centre, Ministry of Fisheries and Agriculture
Host Country Partner Institution(s)	Maldives Dive Centres / Tourist Resorts
Darwin Grant Value	£ XXX
Start/End dates of Project	April 2009 – March 2013
Project Leader Name	Dr Elizabeth Wood
Project Website	http://www.mcsuk.org/conservation_in_action/Coral+reefs/Maldives/Maldives
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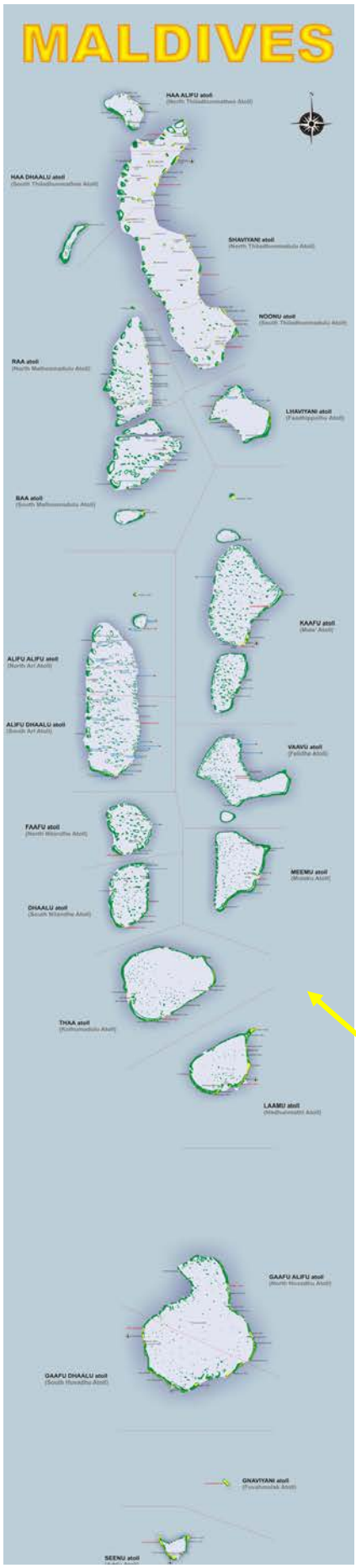
1 Project Rationale

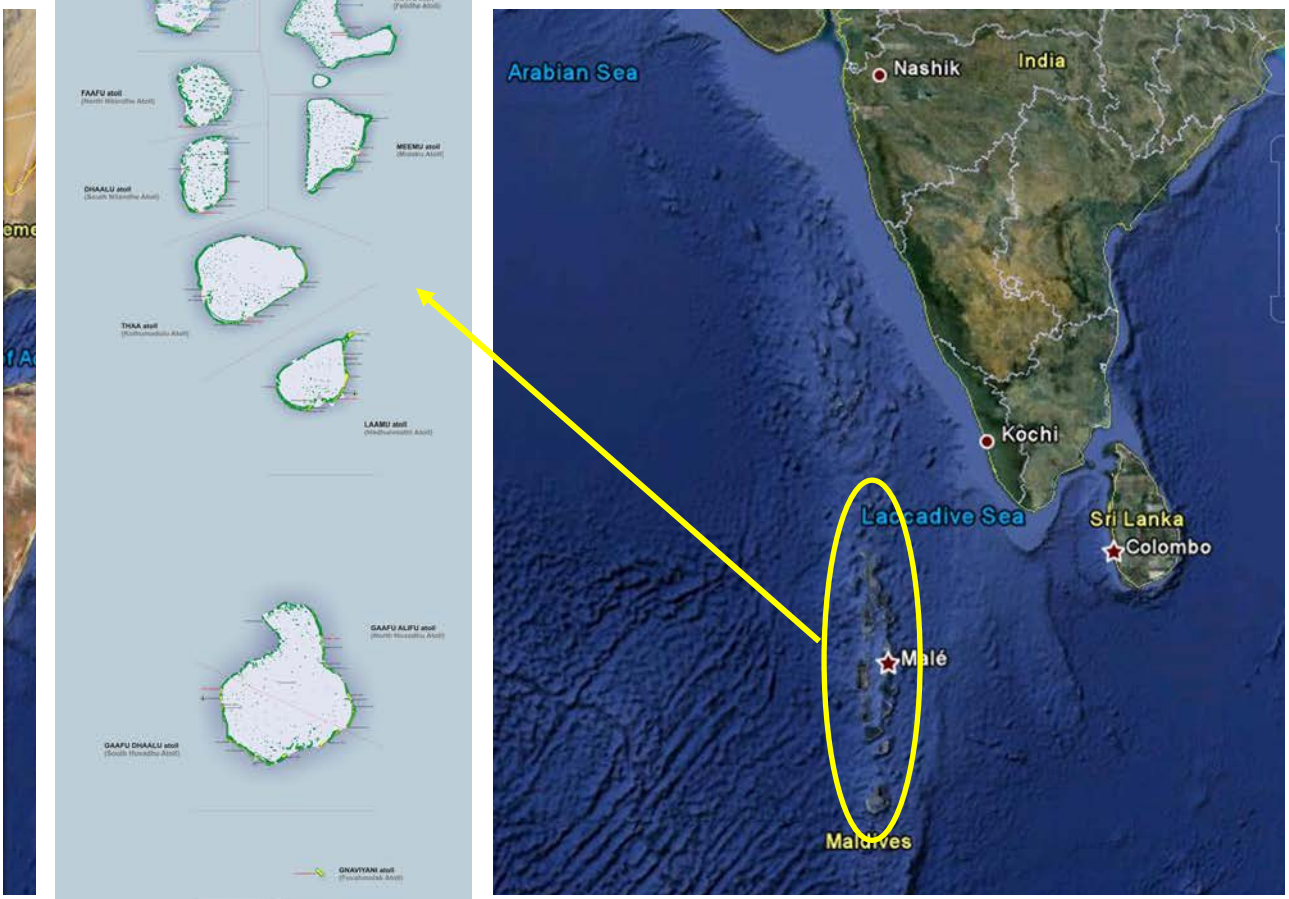
Coral reef fisheries in the Maldives are exerting increasing pressure on the reef ecosystem, and this is happening at a time when coral reefs are facing an unprecedented threat from global climate change. These fisheries are vitally important for livelihoods and the national economy of the Maldives. At least 70 species are targeted for food and hundreds more used for the aquarium export trade. Reef fish also have a high non-use value for tourism which, together with fisheries, is the mainstay of the national economy.

Prior to the start of the Darwin project, the Maldives Marine Research Centre (MRC) highlighted the decline of the grouper fishery over the past decade and the tripling of demand for coral reef fish in the last 15 years that will continue to increase as tourism spreads through the Maldives.



MRC stressed the urgent need for stock assessments and also the need to strengthen collection of fishery data. Fish populations are also at risk from decline in reef health due to global climate change.

Our aim was to ensure that that food security is guaranteed into the future, biodiversity and the livelihoods of fishers are protected and the reefs continue to attract visitors and support the tourist industry. Through research and stakeholder engagement we aimed to produce separate reviews and management plans for grouper, reef fish and aquarium fisheries that would be used as blueprints for sustainable and responsible fisheries into the future.



2 Project Achievements

2.1 Purpose/Outcome

The **project purpose** was 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. Three main outcomes were expected by the end of the project.

a) Coral reef fish monitoring programme established and functioning.

The framework for this was established in Yr 1 through the launching of 'Fishwatch', which is an underwater recording scheme developed by the project that involves dive centres and safari boats throughout the country. We also revived and took on the development and co-ordination of a scheme called 'Sharkwatch', the aim of which is to determine how shark populations in the Maldives respond to the fishing ban introduced in 2009. Both these schemes progressed according to plan (see further details in section 2.3).

MRC is committed to Sharkwatch for the long term and the protocols will continue unchanged at least for the foreseeable future. Fishwatch has been incorporated into the National Coral Reef Monitoring Programme which is currently being developed and tested as a joint venture between MRC and the private sector (tourist resorts). The list of target species has been slightly modified, based on the findings of the first phase of the programme (see Fishwatch Report Annex 5).

A large number of grouper spawning aggregation sites (SPAGs) were identified during an earlier spawning aggregation identification survey funded through IUCN. During the Darwin project we carried out further consultations with grouper fishermen and verified most of the sites. Surveys were then carried out by the project team and MRC in the final year of the project to validate the sites agreed for protection under the new grouper fishery regulations. MRC will be continuing research and monitoring of SPAGs, possibly in collaboration with IUCN and technical expertise from the international marine conservation NGO – SCRAFA (Science and Conservation of Fish Aggregations). http://www.scrfa.org/.

In conclusion, the project has established a solid foundation for coral reef fish monitoring which is set to be continued and further developed.

b) System for recording catch and effort in place and operating

At the outset of the project there was limited information on catch and effort and our main aim was to set in place a system whereby the fishermen themselves recorded numbers and/or weight of fish caught and time spent fishing This was to be achieved through the introduction of daily fishing logbooks and prototypes were designed and tested during the first two years.

After the preliminary trials, introduction of the logbooks was put on hold because of the drafting of more broadly-based fishery log books by the Ministry of Fisheries and Agriculture (MOFA) to meet requirements under recent EU regulations on 'Illegal, unreported and unregulated (IUU)' fishing. We collaborated with MOFA over the design and content of the new logbooks and these are now finalised and beginning to be used.

We also investigated the possibility of using an 'electronic log' rather than paper daily fishing logbooks. Initial trials are underway and it is clear that this scheme has enormous potential because it is user friendly and provides immediate analysis of catch and landing data. Full details of the logbook initiatives are in Section 2.2. Output 2.

Information on catch and effort was also recorded for grouper and reef fish through fishing surveys, with data collection carried out by project and MRC staff and fishermen who we trained to act as fishery officers for short-term data collection. We also devised a programme for recording fish purchase by resorts and household use of reef fish by island communities. It is anticipated that these monitoring programmes will be continued by MRC in conjunction with the private sector as part of the management arrangements for the fisheries.

c) Management plans for coral reef fisheries produced and implemented

During the course of the project we carried out in-depth investigations of the three fisheries (grouper, reef fish and aquarium fish and invertebrates) and identified actual or potential threats to biodiversity and / or fishery sustainability.

The results of these investigations were incorporated into reviews for each fishery (Annex 5). As part of the review process we consulted with fishermen and dealers and ensured that their views were taken fully into account during the development of management objectives, strategies and measures for the three fisheries. Further details of the management plans are in section 2.3., Output 3.

2.2 Goal/ Impact: achievement of positive impact on biodiversity and poverty alleviation

The project goal was to ensure that harvesting of coral reef fish in the Maldives for the aquarium trade and for food is set at a sustainable level that promotes conservation of biodiversity, retains ecosystem function and provides maximum benefits to local communities.

To achieve our goal we needed to work with stakeholders to:

a) Assess the situation and analyse the risks associated with each of the three fisheries
b) Develop plans that would ensure a sustainable future and cause minimal impact on target species and the reef ecosystem and
c) Ensure that these plans would be implemented.

Both a) and b) have been achieved for each of the fisheries and we have paved the way for c). The grouper fishery was our priority as research showed that this fishery was unsustainable. The management plan was finalised in September 2012 and the '*Regulation on Grouper fishing and export of groupers from the Maldives*' was approved by Cabinet in December 2012 and gazetted on 26th May 2013. Implementation has been delayed until March 2014 (see section 2.1).The management guidelines and plans for the other two fisheries are currently going through the final procedures prior to implementation.

2.3 Outputs

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

Prior to the start of the Darwin Initiative project, one-off investigations had been carried out in the late 1980s and again in 2008 to assess the status of selected reef fish species of interest mainly to the marine aquarium trade. An assessment of standing stock of reef fish had also been carried out, based on an exploratory fishery survey carried out in the 1990s.

There were also a few programmes in place that included monitoring of reef fish populations but this was mainly at family level. These are still in place today. The main initiative is the National Coral Reef Monitoring (NCRM) Programme which is run by the Marine Research Centre (MRC) and incorporates15 permanent sites on 5 atolls throughout Maldives. These sites are surveyed annually. In addition MRC used to monitor 12 additional sites as part of the Maldives Environment Management Project (MEMP) but this has been discontinued due to lack of funds.

When the NCRM programme began in response to the bleaching event of 1998 only the substrate was monitored (cover by hard corals and other attached benthic organisms), together

with indicator invertebrates such as giant clams. Fish were included later and followed the categories covered by the international Reefcheck programme (http://www.reefcheck.org/). Reefcheck monitors fish mainly at family level with the exception of the humphead wrasse, bumphead parrotfish and mouse grouper (a species which occurs elsewhere in the Indo-Pacific but not in the Maldives).

Reefcheck is also carried out by a few resorts and expeditions in the Maldives, including a joint operation between the Marine Conservation Society and Biosphere Expeditions which has been running annually over the past few years. There are several consultancy companies in the Maldives that carry out fish surveys at species level for environmental impact assessments (e.g. prior to development of island resorts) and the EIA reports are on the Environmental Protection Agency (EPA) website which can be accessed by the public, although the raw data is not in the public domain.

Our aim was to broaden the scope of reef fish monitoring by establishing a programme that investigated a range of species of current, potential or historic (sharks, humphead wrasse) interest to Maldives commercial fisheries. Carrying out underwater surveys and stock assessments is notoriously costly and time-consuming and we approached this challenge by networking with dive schools in the Maldives, training local dive leaders and marine biologists in survey skills and so greatly expanding the reach and effectiveness of the monitoring programme.

Survey methods were discussed at the outset of the project and after field trials with MRC and Dive Centrres, 78 species were selected for monitoring under the 'Fishwatch' programme together with 9 species of shark in the 'Sharkwatch' programme. The surveys were based on 'timed swims' rather than fixed transects partly because feedback from potential participants confirmed that this methodology is more practical and would fit in better with their commitments to guests and the running of the resort dive centre.

After trials and training, data collection for Fishwatch and Sharkwatch was maintained throughout the project. Nearly 800 Fishwatch surveys of 78 species have been carried out at 125 sites in 13 atolls and approximately 2,000 Sharkwatch surveys have been conducted each year at 170 or more sites (see Fishwatch and Sharkwatch protocols and reports in Annex 5).

The Fishwatch surveys have provided information on the population status and distribution of key species used in the three reef fisheries that are currently in operation in the Maldives. The results have helped in the development of management standards and reference points for the fisheries and data on aquarium fish abundance has been used to calculate sustainable yield and provide guidance for export quota allocations. The Sharkwatch surveys have provided baseline data on sharks which will be invaluable for monitoring the response of the population to the closure of the shark fishery in 2010.

The project also launched a programme to monitor grouper spawning aggregations (SPAGs). Some surveys had been carried out previously on the overall status of groupers on the open reef and in channels (potential SPAGs), but our aim was to conduct surveys specifically during the new moon phase when groupers gather to spawn. The purpose of this was to verify the SPAGs selected for protection under the new grouper regulations and to obtain baseline data on abundance and size of groupers and their reproductive condition. Photographs and videos were also taken to document the aggregations. This programme has been successfully initiated and further surveys / monitoring are due to be undertaken by MRC. However, funding still has to be secured to continue the programme for the long-term.

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

Catch and effort data (catch per unit effort CPUE) provides vital information about stock status and is a useful indicator for monitoring the sustainability of a fishery. A decline in CPUE for a particular species or for all target species combined may (assuming the fishing method has remained the same) signify that stocks are declining and that management needs to be strengthened.

Prior to the project, some information on CPUE existed for grouper, based on information collected from fishermen by MRC staff during sampling trips on fishing boats and at holding cages. This exercise was repeated during the course of the Darwin project to provide updated information for the Management Plan.

Our main aim, however, was to set in place a system whereby the fishermen recorded catch and effort (time spent fishing) on a regular basis. This was to be achieved through the introduction of daily fishing logbooks which were designed and tested during the first year. Complications then arose because of a new system that began to be developed by the Maldives government in response to EU requirements which specify that there have to be 'catch' and 'validation' forms for fish that are exported to the EU. Although compliance within the tuna fishery is the main priority, the Maldives government was aiming for uniformity among all the export fisheries and so both the grouper and aquarium fishery were to be brought into line and follow the same system.

The new arrangement requires each company to record catch by species and location and to submit this information to the Fisheries Management Agency (FMA). Prior to export, the company has to submit a 'validation' request to FMA and exports will be permitted only if the number of fish to be exported tallies with the recorded catch. The logbooks devised under the Darwin Project were slightly modified to fit with these new requirements whilst also providing more detailed information for monitoring purposes. They are now ready for use and formal introduction will coincide with the launch of the management plans for the three fisheries, when it will become mandatory to complete the daily logs as part of the licence requirements.

As an interim measure for the reef fishery, we hired field officers to collect data using the format of the daily logbooks. These field officers were fishermen themselves and we contracted them to gather information twice weekly for 6 months, so as to fulfill 8 fishing trips per month. Data collected about each fishing trip included fishing vessel and crew details, time spent on the trip and time spent for each activity (i.e. bait collection and fishing), locations of bait haul and fishing activities, gear and bait used, catch composition and site specific size composition of catch (reported at a species level) and information regarding sale of catch.

During the latter part of the Yr 3, we began investigating the possibility of using 'electronic' rather than paper daily fishing logbooks. We had in-depth discussions with a commercial software company based in Australia (Catchlog: https://www.catchlog.com/) that specialises in developing software programmes for such purposes and went on to develop a pilot scheme for the grouper fishery. We provided all the necessary information such as maps, species list, length-weight conversion factors and other parameters and Catchlog used this information to build the programme. We then purchased a laptop computer and trained fishermen on one of the grouper vessels how to use the system. Trials are on-going and we hope that MOFA will be convinced that 'Catchlog' could revolutionise the way that data is collected and commit to finding funding for the implementation stage.

In addition to the monitoring described above, we also established protocols and collected data on reef fish purchase by resorts, local reef fish consumption and recreational fishing. This involved the development of data collection sheets, fish identification guides and maps for plotting fishing areas (see Annex 5). We also produced excel data bases for storage and analysis of data. These are held at MRC for future use.

For the fish purchase data, all 100 resorts in the Maldives were contacted through the Ministry of Tourism, Arts and Culture and invited to participate in the survey. They were requested to report their reef fish purchase data on two levels:

a) Number and weight by family groups and a few key species, total price paid per consignment and fishing locations.
b) Size sampling data of reef fish/lobsters for 1 consignment per week for reef fish and every consignment of lobsters.

The first set of data was usually collected by the catering staff and the second by the resident marine biologists at the resorts. Only eight resorts participated in the programme and sent in data on a regular basis. We attributed this to the fact that this programme was conducted on a voluntary participation basis. Hopefully in the future it may be a requirement of the resort lease to provide basis data on fish and lobster purchase.

Prior to the Darwin project, end-use of reef fish had always focussed on the consumption of reef fish by the tourism industry and no surveys have been carried out to assess the amount of reef fish consumed by locals as part of their daily diet. Traditionally, Maldivians mainly ate tuna, but it was clear that there is now an increasing trend in consumption of reef fish on a household level and other events such as barbecues. Hence as part of the effort to monitor use of fishery resources, a household reef fish consumption survey was carried out with the aid of NGOs and students, using a standard survey form devised by the project.

In addition to collection of fishery and local end-use data, we obtained reef fish, grouper and aquarium fish export data from the Basic Fisheries Statistics data of Ministry of Fisheries and Agriculture and analysed it to obtain trends in exports over the past decades.

In summary, there are now well-tested protocols and relevant logbooks available for monitoring catch of groupers, reef fish and aquarium fish and recording information at species level. Protocols and data sheets for fish landings have also been developed. An extensive amount of data has been collected and analysed to provide essential information for development of the management plans. Mandatory reporting of fish catch, purchase and export has been put forward in the management recommendations for each of the fisheries.

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

Three reviews and management plans (grouper fishery, reef fishery, aquarium fishery) have been produced as planned. Production of a grouper management plan was given priority because of the economic importance of the grouper fishery and concerns about over-exploitation in the absence of regulations. A draft review of the fishery was produced in 2011, presenting data on the status of grouper populations, catch and export and the results of consultations with grouper fishermen about management options. A draft Management Plan was also prepared and presented at a Consultative Stakeholder Workshop in Male'. The Fisheries Advisory Board was briefed on the outcomes of the Workshop and they approved the proposed management measures of size limits and protection of selected spawning aggregation sites.

The final Grouper Fishery Review and Grouper Management Plan were produced early in 2012 together with a Cabinet Briefing Paper containing a summary of the review, plan and proposed management measures. The new regulation then began its progress through the formal stages and the project team was no longer directly involved, except in an advisory capacity as required.

The '*Regulation on Grouper fishing and export of groupers from the Maldives*' was finally approved by Cabinet in December 2012 and gazetted on 26th May 2013 (regulation number 2013/R-41 in the government gazette volume 42, number 89).

Implementation and enforcement was due to start 3 months from that date, but this has not yet begun. Implementation was initially delayed by 3 months due to pressure from grouper fishermen and exporters to reduce the size limits. These limits had been determined after sampling 12,000+ individuals of groupers caught from different areas in Maldives and had been been finalized through extensive consultation with the exporters. The Ministry requested additional surveys but it was not possible to undertake these due to national elections and related problems (Oct/Nov 2013) which disrupted both fishing activities and research plans until very recently when further data was collected. According to MOFA, implementation of the regulations has now been deferred until March 2014, but there have been petitions from the fishermen so the outcome remains uncertain.

Management recommendations / plans have also been produced for the reef and aquarium fisheries, again working with stakeholders to ensure that all views are incorporated. Consultations with reef fishermen revealed that 93% thought it was important to manage the fishery and 71% of this 93% thought it was very important. Analysis of the responses of fishermen towards the various options given to manage the fishery showed that the majority felt that year round protection of selected spawning sites of reef fish was the best option out of the six given, followed by the establishment of size limits on catch. These and other measurers have been incorporated into the management recommendations.

The main strategy for managing the marine aquarium fishery / trade has always been through the export quota system and this is well accepted by the fishermen and exporters. A review of the fishery carried out by the project revealed that it largely operates in an ecologically sustainable way but that there have been errors in the allocation of quotas which mean that some species are being exported in excess of the intended limits. Following a consultative workshop with the fishermen and exporters, the quotas were reviewed, revised and published in the Management Plan, together with other measures to ensure sustainability.

In summary, the reviews and management plans provide blueprints for sustainable utilisation of reef fish resources in the Maldives. They are listed in Annex 5.

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

Fishwatch and Sharkwatch reports (Annex 5) have been prepared and circulated to participating Dive Centres, government departments and other stakeholders. In addition, information on abundance has been used to calculate sustainable yield of groupers and marine aquarium fish and the results incorporated into the management plans for these fisheries. These plans have been shared with stakeholders and submitted to the Ministry of Fisheries and Agriculture and Fisheries Advisory Board.

Separate posters on a) Grouper Fishery Management and b) Sharkwatch were presented by Ahmed Najeeb and Mohamed Ushan at the 12th International Coral Reef Symposium in July 2012 and both papers were subsequently published in the Proceedings (Annex 5). A paper on Reef Fisheries in the Maldives – lead author Shahaama Sattar – was presented by Elizabeth Wood at the World Fisheries Congress in Edinburgh, 2012. Other scientific papers are currently being prepared.

The results of grouper stock assessments provided essential data for the preparation of the Grouper Management Plan and grouper fishing regulations and we have taken steps to disseminate the key elements of the regulations to grouper fishermen, exporters and the wider public. Grouper billboards measuring 5ft x 3ft have been prepared – one covering the size regulations and the other showing the special areas to be protected (see Annex 5). These will be erected at island harbours (mainly at the harbours of the grouper fishing islands) and possibly resorts and grouper cages. Posters in dhivehi and English were also prepared for general display including island offices and other public places. About 500 were printed on more durable material that is appropriate for the fishing boats.

We also approached TVM (Maldives Television) with the aim of disseminating information to a bigger and wider audience. A documentary film is virtually complete, covering conservation and management issues relating to the grouper fishery and explaining the aim and benefits of the new regulations. In addition, we have collaborated with TVM in the production of short (30 second) clips to promote awareness of the grouper regulations. These are cartoon-style and will be transmitted between programmes such as the evening news.

Over the course of the project we sought to make resource users more aware of conservation issues by producing relevant materials and engaging them in discussions about research into the status of reef fisheries and management options. For example, during training of the public in data collection we consistently explained the rationale behind the project and the need for and benefits of conservation action. We also produced a cartoon book for children which covered fishing as well as topics such as global climate change and its impact on reefs – a particularly relevant issue for the Maldives.

3 Project support to the Conventions (CBD, CMS and/or CITES)

The project in particular supported Article 10 of the CBD: *Sustainable use of components of biological diversity* and Article 6: *General measures for conservation and sustainable use.* The project focussed on reef fisheries and through scientific research and stakeholder consultation, produced management recommendations and plans for three separate fisheries – grouper, reef fish and aquarium fish. In each case, the aim was to ensure ecological sustainability, conservation of biodiversity and a stable future for local fishermen and other stakeholders who depend on these resources.

The project also contributed to Article 8: *In-situ Conservation* through the protection of selected grouper spawning aggregation sites and the development of guidelines and strategies to regulate use of biological resources. In addition it contributed to the following:

- Article 7: *Identification and Monitoring*: through monitoring of reef fish species
- Article 12. *Research and Training*: through establishment of programmes designed to assess and monitor biological diversity and sustainable use of resources.
- Article13. *Public Education and Awareness*: through production of awareness materials
- Article 16. *Access to and transfer of technology*: through development of electronic log book to record fish catch and landings.

In relation to the above, the project helped the Republic of Maldives meet its obligations under the CBD, by contributing significantly to the government's 'Priority Actions' identified in the National Biodiversity Strategy and Action Plan (NBSAP) produced in 2002. One of these priority actions was to *'Adopt ecologically sustainable fisheries management measures based on best scientific evidence available, to ensure the attainment of maximum economic and social benefit from the sector while conserving resources for future generations'*.

Other priority actions identified in the NBSAP that were supported through the project were to '*Strengthen conservation and management measures for coral reef ecosystems*' and '*Strengthen the system for assessing, monitoring and forecasting the status of biological diversity'*. The project contributed to these objectives by establishing and running several fish and reef monitoring programmes and working with others to ensure that these programmes would be taken forward in the long term.

The focal point for CBD in the Maldives is the Ministry of Environment and Energy (previously the Ministry of Housing, Transport & Environment (MHTE)). MRC and MOFA communicate with this Ministry where there is a project that concerns both Ministries and there was liaison through this avenue. In addition, the project team attended workshops and had a number of meetings with MHTE to discuss issues of mutual interest.

The project was not intended to support either the Convention on Migratory Species (CMS) or the Convention on International Trade in Endangered Species (CITES). However, one of the species monitored through the Fishwatch programme was the Napoleon wrasse *Cheilinus undulatus*, which is listed in CITES Appendix II. This species used to be fished in the Maldives but is now protected and our aim was to provide information on population status that could be compared with other parts of the world.

4 Project Partnerships

The project partner in the Maldives was 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. We established an MoU at the outset of the project. The project counterpart from MRC (Shahaama Sattar) resigned from MRC in May 2011 but formally agreed (with approval from the Fisheries Ministry and the Director of MRC) to continue to co-ordinate technical aspects of the project and to contribute to research and production of reports and management recommendations. She continued in this role for the duration of the project, so providing excellent continuity.

MCS and MRC worked very closely on the project and managed it jointly. The core team comprised Elizabeth Wood (project manager, MCS), Mariyam Saleem (project counterpart in Year 1) and Shahaama Sattar (project counterpart for the rest of the project), Fahmeeda Islam (MRC) and the two full time project staff who were employed by MRC but 100% funded through the Darwin Initiative. These were Mohamed Ushan, Reef Survey Project Officer and Ahmed Najeeb, Reef Fishery Project Officer.

The project staff worked together at MRC and there was regular e-mail contact between all the team members to discuss project development and day-to-day activities. Other staff at MRC assisted with project activities as the need arose, especially on field trips when a team of at least four people was needed to collect fishery data or carry out surveys. In these cases, subsistence and field allowances were provided through the DI project. We also assisted MRC on programmes of mutual benefit, such as reef monitoring.

Other project partners in the Maldives were the Dive Centres and Marine Labs associated with the resorts that are scattered throughout the country. The main purpose of these collaborations was to involve Dive Centres in the project's reef monitoring programme (Fishwatch and Sharkwatch) which aimed to gather data on the distribution and abundance of reef fish. Another purpose of the collaboration with the Dive Centres was to enlist their help in recording use of reef fish by the resort restaurants and also recreational night fishing. One challenge in establishing these partnerships is that resort staff have many other responsibilities and often their engagement in conservation programmes depends on the attitude of the resort managers and owners. Another complicating factor was that the majority of key staff at the Dive Centres were expatriates and were often in post only for a year or so. Continuity was occasionally an issue but most of the participants briefed their replacement and so the surveys would pick up again.

The project collaborated closely with fishermen, fish traders and exporters in both the aquarium trade and food sectors. These stakeholders depend on, and have an extensive knowledge of reef resources and were involved in all aspects of the project. Most importantly, they participated in workshops and registered their views about management through consultative meetings on the islands. We found that they were very ready to provide information, engage in debate and voice their opinions.

Other Collaboration

Throughout the project we met and consulted with government departments and representatives from international programmes that were also involved in marine resource survey and management. The aim of these consultations was to brief people on project progress, discuss issues of mutual interest and see how we could work together to address conservation and management issues.

Ministry of Fisheries and Agriculture (MOFA)

We had roughly annual meetings with MOFA to discuss project progress and the development of the fishery management plans and also briefed the Ministers (there were two during the course of the project, due to a change in government). We also had regular discussions with the Fisheries Management Agency (FMA) within MOFA and briefed the Fisheries Advisory Board (established within MOFA) on technical details and rationale behind the Grouper Management Plan. FAB is a statutory body comprising representatives from the government and fishing industry and has to ratify new legislation before it passes to the Cabinet to be gazetted.

Environmental Protection Agency (EPA)

Environmental Protection Agency (EPA) is an independent legal regulatory entity under the Ministry of Environment and Energy and its responsibilities include Protected Areas and protected species. Representatives from EPA attended project workshops and we consulted them about specific issues on a number of occasions. For example, we arranged a special meeting to discuss the proposed Grouper Spawning Aggregation sites to be protected from all activities under the Grouper Fishery Management Plan.

Department of National Planning (DNP)

We had several discussions with DNP during the course of the project and sought their permission to carry out the Household Surveys on fish consumption. We also liaised with them about GIS maps for the Maldives which were needed for plotting fishing activities.

Ministry of Tourism, Arts & Culture (MOTAC)

Several components of the project were connected with the Tourism Sector and, in addition to working directly with individual resorts, we also liaised with MOTAC and worked with them to involve resorts in fish surveys and other data collection. An attempt had been made some years prior to the start of the Darwin project by MOTAC to collect information on landings of fish and lobsters at resorts, but take-up was limited and data were no longer being submitted. We therefore joined forces with the Ministry in 2012 in a bid to extend and revive the initiative and to provide more data on fish purchase and night fishing.

Ministry of Education

As part of our work to collect data on household consumption of reef fish, we approached the Ministry of Education to ask if they could assist us with getting school children involved in a simple survey. They readily agreed to this and helped by circulating batches of project printed questionnaires and information sheets to the Island Education Centres.

Maldives Customs Service (MCS)

Representatives from the Maldives Customs Service participated in the Grouper Management Workshop, and Darwin project staff also participated in a meeting with Maldives Custom Service, the Fisheries Management Agency and MRC staff to discuss changes in the current export procedure as they apply to aquarium fish.

Maldives National Defence Force (MNDF) and Marine Police

The Fisheries Ministry (MOFA) does not have patrol boats and so cannot engage in surveillance operations, except through Fishery Officers stationed on the islands. The MNDF and Marine Police are active in law enforcement at sea and we have worked with them during the project to see if they can assist with enforcement of fishery regulations. Representatives of the MNDF and Marine Police attended the Grouper Management Workshop and they confirmed their willingness to help monitor and enforce reef fishery regulations provided they were fully briefed on these matters.

Maldives Environment Management Project (MEMP)

Throughout the project, we collaborated and shared plans and information with MEMP. This 5-year project (2008-2013) was supported by the World Bank and funded by the Board of International Development Assistance. The project focused on the North Province of the Maldives (Noonu, Raa, Baa and Lhaviyani Atolls) and concentrated on solid waste management, capacity building for environment management and technical assistance for strengthening environmental monitoring. MRC is a key stakeholder in the project, particularly with regard to the fishery and coral reef components. The Darwin Project worked with the MEMP/MRC monitoring team to organise survey trips and collect data that was of benefit to both programmes. This simplified field work logistics and reduced costs.

One of the outputs from MEMP was the production of a report in 2009, proposing 15 scalable protocols for monitoring the links between reef health, social and economic use and the vulnerability and resilience of these links to projected climate change. The Darwin Project shared information and ideas with regard to development of the MEMP monitoring and evaluation (M&E) framework. This included collaboration on a new project (see below) which will further develop this monitoring programme.

Wetlands Conservation and Coral Reef Monitoring (WCCM) Project

To address climate related risks facing Maldives and strengthen the country's resilience to climate change risks, a multi-donor Maldives Climate Change Trust Fund (CCTF) was established in 2011, administered by the World Bank and European Union. One of the projects being supported by CCTF is Wetlands Conservation and Coral Reef Monitoring (WCCM) which is focusing on coral reef ecosystem monitoring and management for climate change adaptation. We attended a planning workshop for this project in June 2011 and continued to collaborate with the CCTF-WCCM team as the project progressed. It formally began early in 2012 with the aim of further developing the national coral reef monitoring protocols initiated under the MEMP programme. This programme is also designed to build on and complement protocols and training developed under the Darwin Initiative project.

A key objective was to develop and pilot a web-enabled coral reef monitoring framework for evidence-based management of the coral reef ecosystem. Within this framework is an *"Extended Swim*" protocol designed to collect information on the status of reef fish, coral and invertebrates along a fixed transect. Four levels of detail are proposed, including one that adopts the Fishwatch approach (i.e. recording of species of fishery importance). The main difference proposed is that the new protocols are proposed to be carried out along fixed transects.

We also collaborated with a programme initiated by Kuoni Travel, Seamarc Pvt. Ltd., and the International Union for the Conservation of Nature (IUCN), called 'Enhancing the Resilience of Coral Reefs and Assessing Vulnerability of Ecological and Social Communities to Climate Change'. The aim of this project was to contribute to the effort to develop a standard reef monitoring programme and to provide the national government and managers with information about coral reef systems. It adopted the Darwin Project's Fishwatch, Sharkwatch and Fish Landing programmes and also promoted 'Bleachwatch' (an international scheme to monitor incidence of coral bleaching) and the photo survey technique (CPCe) for monitoring reef condition. We participated in a planning workshop for this project, assisted with the development of protocols for the survey techniques and also provided training for participating resorts at a workshop run by the project partners.

One of the Darwin project aims was to collect data on local reef fish consumption and as part of this programme we collaborated with a local NGO called Tiny Islands that works with local communities to achieve sustainability on their islands. After training from the Darwin project staff, Tiny Islands carried out the project's fish consumption household surveys in two atolls where they are based.

During the course of the project we also collaborated with the Land and Marine Environmental Resources (LaMer) Group (Maldives), Biosphere Expeditions (UK) and Six Senses Soneva Fushi (Maldives) to produce a colouring book for distribution to local school children. The booklet was adapted for the Maldives from an original story developed by MCS and the International Coral Reef Action Network (ICRAN) for Sabah, Malaysia under an earlier Darwin Project. The Maldives book has a storyline that illustrates the main issues facing coral reefs in Maldives such as climate change, fishing and tourism.

The Marine Conservation Society continued to work with the Reef Check Foundation and helped to promote Reef Check 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. MCS and Biosphere Expeditions undertook surveys in and in 2012, our project officer Mohamed Ushan (Marine Research centre) was awarded a scholarship to take part in the expedition and become trained as a Reef Check certified RC Ecodiver, able to undertake RC surveys.

5 Contribution to Darwin Initiative Programme Outputs

5.1 Technical and Scientific achievements and co-operation

An important component of the project was the production of detailed reviews of each of the reef fisheries (grouper, reef fish and aquarium fish). This entailed the collection and analysis of a large amount of both biological and socio-economic data.

Biological research carried out by the project included the following:

- Checking species validity and updating reference lists of species that are targeted for the 3 fisheries.
- In-situ surveys to determine distribution and abundance of groupers, reef fish, aquarium fish and sharks.
- Sustainable yield calculations from the abundance data for groupers and selected aquarium fish.
- Collection of fishery data through monitoring of catch and export. This included collection of species-specific information on number and size of individuals harvested and analyse to determine trends.
- Research into quantities and sizes of reef fish used by the tourism industry in the Maldives and also consumption by the local community.
- Analysis of export data through for food and aquarium fish to determine quantities and trends.

Socio-economic research carried out by the project included the following:

- Collection of data on value of fish according to species and size together with overall value at point of sale and export. Analysis of trends.
- Working with fishermen and dealers to document their views about the state of health of the resources and their views about different management options.

Results of the research have been incorporated into the separate fishery reviews and used as a basis for the production of management plans/recommendations.

5.2 Transfer of knowledge

The project transferred knowledge in several ways. For example, during the development of protocols for Sharkwatch we networked with international shark specialists to determine the most appropriate methodology and this has now become established and forms the basis for future monitoring of shark populations in the Maldives. Another example was our collaboration with international experts in the application of electronic logbooks (Catchlog) to record fish catch and landings. The pilot trial has shown that this method has significant potential in solving the practical challenge of obtaining real-time data which is of vital importance for managers and also for the fishermen.

Another innovation was the introduction of 'citizen science' in which volunteers in the private sector were trained to carry out monitoring work and solve the challenge faced by policy makers of the lack of sufficient data about the status of natural resources. This type of approach had not been used previously in the Maldives and proved to be very successful in amassing large amounts of data.

5.3 Capacity building

All project activities were carried out in partnership with the Marine Research Centre (MRC) and Ministry of Fisheries and Agriculture (MOFA), thereby helping to build capacity within government to meet CBD commitments. One of the specific aims of the project was to build capacity within the Marine Research Centre to be better able to monitor coral reef fish populations and apply the findings to formulate integrated management plans.

Training was an essential part of the project and was provided throughout the project through a combination of classroom and hands-on field work to a range of people and organisations including MRC staff (all aspects) divers (Fishwatch, Sharkwatch) and fish buyers (fish purchase) in the private sector, school students (collection of household use data) and fishermen (collection of fishery data).

Through these efforts, a wide range of individuals were actively involved in data collection and this has increased capacity and paved the way for further monitoring of biodiversity within the country.

5.4 Sustainability and Legacy

There are several project achievements which we believe are likely to endure and will be the key to long-term sustainability and legacy of the Darwin project:

a) Production of management recommendations / plans for reef fisheries

One of the main achievements of the project was to produce management plans / recommendations for each of the three reef fisheries. These were based on stakeholder consultations and sound scientific data and will have a lasting impact on reef fishery policy and management. There are still obstacles in the form of political will and financial resources to carry through the relevant legislation and to implement all the measures in full, but already some are being adopted and this is a direct legacy from the project.

b) Involvement of the private sector in reef and fishery monitoring

Another achievement which we anticipate will endure is engagement of the private sector in broad-scale monitoring of reefs and biodiversity. Given the lack of resources within government and the dependence of the tourism sector on healthy reefs, it is particularly important that these voluntary monitoring activities become an accepted part of the everyday operations of resorts and dive centres. Other programmes are also now encouraging this approach (e.g. Wetlands Conservation and Coral Reef Monitoring project see section 4) and there have been discussions and suggestions that some form of participation in monitoring programmes should become mandatory, for example as part of the lease agreements of the resorts. The current issue is that while many in the private sector accept that they should play a role in helping to monitor the health of the reef on which their future livelihoods depend, there are restraints and conflicts regarding allocation of staff time and resources to such ventures.

c) Engagement of reef fishermen and traders

Stakeholder engagement was one of the key elements of the project and we also put effort into awareness and outreach with a view to promoting better understanding of fishery issues and the steps that are being taken to ensure long-term sustainability of stocks and livelihoods. This programme is on-going through MRC and we believe is an important legacy because it is clear that the future behaviour of the fishermen themselves will largely determine the success of some of the proposed management measures such as protection of grouper spawning aggregations. If the fishermen are fully aware of the benefits of managing the fisheries and remain engaged with the management processes and agreed strategies, then the chances of sustainability for the fisheries will be significantly enhanced.

Both of the two full time project staff applied for posts at the Marine Research Centre at the end of their contract with the Darwin Initiative Project and both were successful in their applications. However, Mohamed Ushan only remained in the post for 9 months before moving to take up a job as assistant marine biologist at one of the resorts. This is an important step because the great majority of the marine biologists in the private sector are expatriates and it is clearly beneficial to allocate posts to Maldivians. Ahmed Najeeb is working as a research officer at MRC and continuing with many of the aspects of reef and grouper fisheries that were at the core of the Darwin project.

6 Lessons learned

The management structure for this project worked well, as described in Section 4. We had anticipated at the outset that graduates would have been employed as the two full time local project officers, but found that it was difficult to find staff with these qualifications due to the lack of graduate courses in marine science in the Maldives and also the low salaries paid in the government sector (whose pay structure we were following) in comparison with the private consultancy sector. However, the two project officers employed in the project did have experience in fishery research, marine biological studies and working with the tourism sector and these attributes helped to ensure that we were able to achieve the project aims. The role of the part-time project counterpart in co-ordinating technical, research and reporting aspects of the project was invaluable. She was an experienced fisheries biologist initially employed by MRC, then joined the project as a consultant.

One of the lessons learnt early in the project was the necessity to be flexible and to respond to additional needs. Whilst we had a good understanding of the underlying issues and had put together a work plan to address them, it was not until after the inception meetings and in-depth discussions that we realised the need for some additional activities such as the monitoring of grouper spawning aggregation sites and shark populations, research into end-use (including household consumption) and analysis of export data.

A lesson learnt during the course of the project was that it was time consuming and not always as easy as we anticipated to involve the private sector and other volunteers in project activities such as data gathering. For example, when collecting information on resort landings we followed protocol by doing this through the Ministry of Tourism, Arts and Culture (MOTAC) and whilst we did get some take-up it was not as extensive as we had hoped, despite follow-up calls to try and locate and speak to people who would be willing to oversee the data collection. We had similar experiences when we launched the initiative to collect to collect data on household consumption of reef fish though the Ministry of Education. Again this was a slower process than we anticipated and we did not get as large a response as we had hoped.

With regard to involving dive centres and marine biologists in monitoring programmes we found that staff sometimes wanted to help but were constrained by time because of their obligations and commitments to guests. The level of engagement often depended on the attitude of the resort management – some were more supportive than others and some concentrated more on their own projects such as coral propagation or turtle protection. Finally, there was quite a regular turn-over of marine biologists and dive centre staff which occasionally caused disruption to the monitoring programmes.

6.1 Monitoring and evaluation

Project progress was monitored against the targets set in the implementation timetable and indicators in the logframe. This overall plan was used to guide activities and ensure that we were making progress towards the project goals. Overall, the M & E system was practical and helpful. In particular the regular Annual Reviews assisted us in evaluating where there were gaps and where emphasis should be placed in the following year of activities. We did not an additional external evaluation of the project.

6.2 Actions taken in response to annual report reviews

Action was taken in response to the Yr 1 annual review and covered fully in the half-year report (October 2010). No other additional issues have been raised.

7 Darwin identity

The project was branded at the inception meeting as the *'Darwin Reef Fish Project*' in recognition of the Darwin Initiative and because this was seen by all the partners as a title that would be widely recognised and remembered. The project had a clear identity and was not part of any other programme. Due to the above, there is a good understanding of the Darwin Initiative particularly within the Ministry of Fisheries but also in other government departments, agencies and the private sector.

The Darwin name and logo was used on all publications, powerpoint presentations, posters, brochures and other project materials and Darwin Initiative formally acknowledged at public meetings, workshops, and on scientific publications etc.

8 Finance and administration

8.1 Project expenditure

Project spend since last annual report	2012/13 Grant (£)	2012/13 Total actual Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)	XXX	XXX	+ 0.8	
Overhead Costs	XXX	XXX	00	
Travel and subsistence	XXX	XXX	-2.6	
Operating Costs	XXX	XXX	-3.8	
Capital items (see below)	XXX	XXX		
Others (see below)	XXX	XXX	+7.5	
TOTAL				

Staff employed (Name and position)	Cost (£)
Dr Elizabeth Wood Project Manager	XXX
Shahaama Sattar Project counterpart	XXX
Ahmed Najeeb Project Fisheries Officer	XXX
Mohamed Ushan Project	XXX
TOTAL	XXX

Other items – description	Other items – cost (£)
Printing for stakeholder meetings Printing survey sheets & survey protocols Materials & costs for workshops Repair to underwater camera Laptop for Catchlog trial	XXX XXX XXX XXX XXX
TOTAL	XXX

8.2 Additional funds or in-kind contributions secured

Source of funding for project lifetime	Total (£)
Marine Research Centre contribution	XXX
MRC and Dive Centre staff costs	XXX
Shared costs on boat hire etc from other funded programmes	XXX
TOTAL	XXX

Source of funding for additional work after project lifetime	Total (£)

In-kind contributions consisted of volunteer time from those participating in Fishwatch and Sharkwatch throughout the project. At least 14,000 hours has been contributed, valued at over **£** XXX

8.3 Value for Money

We consider the project was great value for money. Through the project we engaged with stakeholders, developed and set up underwater monitoring schemes for reef fish including sharks, collected fishery data, produced in-depth reviews of the three reef fisheries and management recommendations and plans for sustainable fisheries. At an average cost to the DI of £ XXX, much of which was spent in the host country, this is very good value for money.

Annex 1 Report of progress and achievements against final project logframe for the life of the project

Note: For projects that commenced after 2012 the terminology used for the logframe was changed to reflect DFID's terminology.

Project summary	**Measurable Indicators**	**Progress and Achievements in the last Financial Year** (2012-2013)	**Actions required/planned for next period**
Goal/Impact: 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.		Reviews and management recommendations/plan for coral reef fishery and marine aquarium fishery finalised following stakeholder workshops. These provide a framework for sustainable use of resources and conservation of biodiversity.	Do not fill not applicable
Purpose/Outcome 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.	1. Fishwatch (coral reef fish monitoring programme) continued throughout Yr 4, providing data for the reviews and management plans. 2. The systems for recording catch and effort have been finalised and trials carried out. 3. The 'Regulation on Grouper fishing and export of groupers from the Maldives' (based on the project's Review and Management Plan was approved by Cabinet in Dec 2012 and gazetted in May 2013. Implementation has been delayed several times but is now scheduled for March 2014. 4. Reviews and management recommendations/plan for reef fish and aquarium fishery completed.	Do not fill not applicable
Output 1. 1. Reef fish monitoring programme established and coral reef fish stock assessments / habitat assessments completed	1.1. Volunteer data collectors sustain interest and provide good quality data from surveys by yr 2 and on-going until end of project. 1.2. Data from surveys analysed annually from yr 2 and results disseminated to volunteer data	Data collection for Fishwatch and Sharkwatch was maintained throughout the project and has provided a useful dataset for the selected species. For example, nearly 800 Fishwatch surveys of 78 species have been carried out at 125 sites in 13 atolls and approximately 2,000 Sharkwatch surveys have been conducted each year at 170 or more sites. The surveys have provided information on the population status and distribution of key species used in the three reef fisheries that are currently in operation in the Maldives. The results have helped in the development of	

Project summary	Measurable Indicators	Progress and Achievements in the last Financial Year (2012-2013)	Actions required/planned for next period
	collectors and other stakeholders. 1.3. Results of all surveys combined and incorporated into pilot fishery management plan early in Yr 3 and final management plan by end of project. 1.4. Data on grouper spawning aggregations incorporated into management decisions and plans by early in year 3.	management standards and reference points for the fisheries and data on aquarium fish abundance has been used to calculate sustainable yield and help in the setting of quotas. The Sharkwatch surveys have provided baseline data on sharks which will be invaluable for monitoring the response of the population to the closure of the shark fishery in 2010. A large number of grouper spawning aggregation sites were identified during consultations with grouper fishermen and surveys were carried out by the project team and MRC in the final year of the project to validate the sites put forward by the fishermen. This work is ongoing.	
Activity 1.1. Stakeholder meetings to discuss aims, methods, progress		Discussions with stakeholders from the fishery, government, NGOs and private sector took place throughout the project and during formulation of the management plans.	
Activity 1.2. Establish network of survey teams		The survey teams were mainly established in the first and second year with some new entrants later.	
Activity 1.3. Develop protocols for monitoring of fish populations and reef health & produce recording sheets & field data sheets etc		The protocols developed in Yr 1 were used throughout the project, with a few minor modifications / improvements. Manuals explaining the protocols were provided to all participants, along with the suite of data entry files.	
Activity 1.4. Training workshops for MRC staff and other participants		MRC and MCS carried out training sessions for participants, some in collaboration with the developing programme for national coral reef monitoring.	
Activity 1.5. Design databases and train MRC staff & other stakeholders		The excel spreadsheets developed in year 1 were used successfully throughout the project.	
Activity 1.6. Data collection / field surveys / data entry		Data collection and entry for Fishwatch and Sharkwatch continued throughout the project.	
Activity 1.7. Analysis of data and production of report(s)		Fishwatch results have been analysed and a report produced which analyses nearly 75,000 records of the 77 species being monitored and presents comparisons between different atolls and protected/open access areas. Sharkwatch data has been analysed and three annual reports produced – each covering about 2,000 surveys.	

Project summary	Measurable Indicators	Progress and Achievements in the last Financial Year (2012-2013)	Actions required/planned for next period
Activity 1.8. Continued data collection & analysis Yr 4		As above	
Activity 1.9. Management of 'Sharkwatch'		Continual and being maintained within MRC	
Activity 1.10 Research into spawning aggregations		Investigations into the location of grouper aggregation spawning sites was carried out prior to and during the Grouper Management Workshop in September 2011. Several in-situ surveys of these sites have been carried out at spawning times to obtain baseline data. This work is on-going within MRC	
Output 2. System for long-term monitoring of catch, effort and value of reef fisheries established.	2.1. Fishers participate in the log book scheme and provide reliable data from yr 2 and on-going until end of project. 2.2. Data from fisher log books analysed and results incorporated into the fishery management plans. 2.3. Data from log books and surveys of 'end use' analysed and incorporated into fishery management plans.	Work began on design of logbooks at the outset of the project, with separate ones prepared for each of the three fisheries. Some were tested in the field by the fishermen and they were also used by fishery officers employed by the project to collect data. Full introduction was put on hold because of continued debate due to new government regulations that require 'catch and validation' information prior to export. Further adjustments were made to the logbooks to accommodate these requirements. For reef fish and grouper, catch, landings and other end-use data was analysed. For aquarium fish, information was extracted from the export proformas which provide raw data on numbers / species exported and their destination. Overall export value for aquarium fish and grouper products is extracted by Maldives Customs, based on declarations by the industry on consignments leaving the country (FOB value – free-on-baord). We used these figures to identify trends.	
Activity 2.1. Produce daily logbook for reef fishers in collaboration with stakeholders; and adapt as necessary, based on feedback.		Logbooks for the three reef fisheries (grouper, reef fish, aquarium fish) were developed and tested over the course of the project. Further adjustments had to be made to ensure they complied with the new policy that requires 'catch and validation' information prior to export. A pilot electronic logbook was developed for the grouper fishery. This system (Catchlog) is run by an Australian company specialising in electronic logs for commercial fisheries and is a new innovation for the Maldives.	

Project summary	Measurable Indicators	Progress and Achievements in the last Financial Year (2012-2013)	Actions required/planned for next period
Activity 2.2. Train fishers in data entry.		Training sessions and trials were carried out with the aquarium fishermen during Yr 3. Reef fishermen were trained in collection of reef fishery data in year 4 and they then monitored catch and obtained data for the reef fishery review. One of the grouper fishing boats was selected for the Catchlog trial and the fishermen were trained in the use of the programme and provided with a laoptop to enter data.	
Activity 2.3. Establish databases and train MRC staff in data entry and analysis		This activity is ongoing, alongside the development of the updated logbooks.	
Activity 2.4. Data collection		As above	
Activity 2.5. Data analysis and production of reports and recommendations		Pending – currently we have insufficient log book data for analysis due to the ongoing changes, apart from the data collected by the Fishery Officers which has been analysed and the results incorporated onto the Fishery Review.	
Activity 2.6. Collection and analysis of fishery data		A large amount of data on each if the fisheries has been collected, analysed and incorporated into the three fishery reviews.	
Activity 2.7 Design and introduce logbooks for 'end users'		Protocols and data record sheets for fish landings were finalised in Year 3 and have been successfully used to collect data.	
Activity 2.8. Collect, enter and analyse export data		Proforma export forms for aquarium species and for groupers are collected by Customs and passed to MRC for data entry and analysis. The Darwin Project Officers extracted and analysed this information and the results were incorporated into the fishery reviews.	
Activity 2.9. Develop identification guides to reef fish for stakeholders		Guides to reef fish and groupers were completed in Year 2. During Yr 3 the aquarium trade export list has been revised and updated and now stands at over 250 species.	
Activity 2.10. Consultations and fact-finding meetings with fishery stakeholders		During the course of the Project, consultations and workshops were held with aquarium, reef fish and grouper fishermen, aquarium fish exporters, grouper	

Project summary	Measurable Indicators	Progress and Achievements in the last Financial Year (2012-2013)	Actions required/planned for next period
		live fish cage owners and exporters and fish buyers from resorts. The aim of these meetings was to discuss progress and gather additional information on the fisheries.	
Activity 2.11. Seminars with Maldives Customs Services		Meetings were held with MCS to discuss issues relating to export of reef fish resources and MCS representatives also attended the grouper workshop and contributed to discussions about proposed management and monitoring measures.	
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.	Priority was given to the production of a Grouper Management Plan because of fears about sustainability. Management plans/recommendations for the other fisheries were not produced until the final year, once all the necessary data had been assembled. Despite the Grouper Management Plan being ratified in Dec 2012, management measures have yet to be introduced on the ground due to petitions by the fishermen and political issues..	
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.		The final draft of the Grouper Management Plan was produced ahead of schedule and plans for the other fisheries were finalised by the end of the project.	
Activity 3.3. Management measures introduced on the ground by end Yr 4		Work is on-going at MRC and FMA/MOFA to implement the management measures.	
Output 4. Results of reef fish stock assessment and reef health monitoring widely disseminated.	4.1. Website established. 4.2. Workshops with stakeholders. 4.3. Articles and scientific papers prepared. 4.4. Data shared with global databases	Project information is included on the MCS website. Workshops and focus group meetings have been held with stakeholders to discuss research findings and articles and scientific papers prepared. The raw data is available although, with the exception of Reefcheck data (which has been submiitted) is not compatible with global databases.	
Activity 4.1.		Project information is	

Project summary	Measurable Indicators	Progress and Achievements in the last Financial Year (2012-2013)	Actions required/planned for next period
Website established		at http://www.mcsuk.org/conservation_in_action/Coral+reefs/Maldives/Maldives	
Activity 4.2. Workshops with stakeholders		Workshops have been held for the grouper and aquarium fisheries and a reef fishery workshop is about to take place.	
Activity 4.2. Articles and scientific papers prepared		Several papers and articles have been published (Annex 5) and papers on each of the fisheries are in preparation.	
Activity 4.3. Data shared with global databases		See above	

Annex 2 Project's full logframe, including indicators, means of verification and assumptions

Note: Insert your full logframe. If your logframe was changed since your Stage 2 application and was approved by a Change Request the newest approved version should be inserted here, otherwise insert the Stage 2 logframe.

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	[redacted]
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.	1. Reports of workshops 2. Monitoring reports 3. Fishing log books 4. Management plan(s) 5. Fishing log books	

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Outputs 1. Reef fish monitoring programme established and coral reef fish stock assessments / habitat assessments completed	1.1. Volunteer data collectors sustain interest and provide good quality data from surveys by yr 2 and on-going until end of project. 1.2. Data from surveys analysed annually from yr 2 and results disseminated to volunteer data collectors and other stakeholders. 1.3. Results of all surveys combined and incorporated into pilot fishery management plan early in Yr 3 and final management plan by end of project. 1.4. Data on grouper spawning aggregations incorporated into management decisions and plans by early in year 3.	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. Fishers participate in the log book scheme and provide reliable data from yr 2 and on-going until end of project. 2.2. Data from fisher log books analysed and results incorporated into the fishery management	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

Project summary	Measurable Indicators	Means of verification	Important Assumptions
	plans. 2.3. Data from log books and surveys of 'end use' analysed and incorporated into fishery management plans.		
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.	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	4.1. Website established. 4.2. Workshops with stakeholders. 4.3. Articles and scientific papers prepared. 4.4. Data shared with global databases	1. Website 2. Electronic and hard copies of articles & reports	

Annex 3 Project contribution to Articles under the CBD

Project Contribution to Articles under the Convention on Biological Diversity

Article No./Title	Project %	Article Description
8. In-situ Conservation	30	Establish systems of protected areas with guidelines for selection and management; regulate biological resources, promote protection of habitats; manage areas adjacent to protected areas; restore degraded ecosystems and recovery of threatened species; control risks associated with organisms modified by biotechnology; control spread of alien species; ensure compatibility between sustainable use of resources and their conservation; protect traditional lifestyles and knowledge on biological resources.
10. Sustainable Use of Components of Biological Diversity	50	Integrate conservation and sustainable use in national decisions; protect sustainable customary uses; support local populations to implement remedial actions; encourage co-operation between governments and the private sector.
Other Contribution	20	Smaller contributions (e.g. of 5%) or less should be summed and included here.
Total %	100%	Check % = total 100

Annex 4 Standard Measures

Code	Description	Totals (plus additional detail as required)
Training Measures		
1a	Number of people to submit PhD thesis	
1b	Number of PhD qualifications obtained	
2	Number of Masters qualifications obtained	
3	Number of other qualifications obtained	
4a	Number of undergraduate students receiving training	
4b	Number of training weeks provided to undergraduate students	
4c	Number of postgraduate students receiving training (not 1-3 above)	0 * see note
4d	Number of training weeks for postgraduate students	0 * see note
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification(i.e. not categories 1-4 above)	
6a	Number of people receiving other forms of short-term education/training (i.e. not categories 1-5 above)	60 Staff from MRC & dive team members from private sector
6b	Number of training weeks not leading to formal qualification	20
7	Number of types of training materials produced for use by host country(s)	2 Powerpoint presentations; survey protocols
Research Measures		
8	Number of weeks spent by UK project staff on project work in host country(s)	25
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s)	3 Grouper MP; Reef Fishery MP & Aquarium Fishery MP
10	Number of formal documents produced to assist work related to species identification, classification and recording.	7 ID posters; illustrated field survey record sheets; field guides; grid maps for plotting fishing activities; fish landing record sheets; household consumption record sheets.
11a	Number of papers published or accepted for publication in peer reviewed journals	2 Proceedings International Coral Reef Society Symposium 2012
11b	Number of papers published or accepted for	

Code	Description	Totals (plus additional detail as required)
	publication elsewhere	
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	6 Fishwatch, Sharkwatch, export data, fish catch, fish landings, night fishing
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	
13a	Number of species reference collections established and handed over to host country(s)	
13b	Number of species reference collections enhanced and handed over to host country(s)	
Dissemination Measures		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	4
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/ disseminated.	4
15a	Number of national press releases or publicity articles in host country(s)	1
15b	Number of local press releases or publicity articles in host country(s)	
15c	Number of national press releases or publicity articles in UK	
15d	Number of local press releases or publicity articles in UK	
16a	Number of issues of newsletters produced in the host country(s)	
16b	Estimated circulation of each newsletter in the host country(s)	
16c	Estimated circulation of each newsletter in the UK	
17a	Number of dissemination networks established	1
17b	Number of dissemination networks enhanced or extended	
18a	Number of national TV programmes/features in host country(s)	
18b	Number of national TV programme/features in the UK	
18c	Number of local TV programme/features in host country	
18d	Number of local TV programme features in the UK	
19a	Number of national radio interviews/features in	

Code	Description	Totals (plus additional detail as required)
	host country(s)	
19b	Number of national radio interviews/features in the UK	
19c	Number of local radio interviews/features in host country (s)	
19d	Number of local radio interviews/features in the UK	
Physical Measures		
20	Estimated value (£s) of physical assets handed over to host country(s)	
21	Number of permanent educational/training/research facilities or organisation established	
22	Number of permanent field plots established	
23	Value of additional resources raised for project (*See Section 8.2 above*)	
Other Measures used by the project and not currently including in DI standard measures		

- 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.

Annex 5 Publications

Type (eg journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £
Information leaflet	Darwin Reef Fish Project	MCS/MRC		0 but See note 1
Information leaflet	Fishwatch Maldives	MCS/MRC		0
Field identification sheets for fish	Fishwatch Maldives fish survey sheets	MCS/MRC	As above	0
Reef monitoring manuals	Fishwatch and Sharkwatch Manuals	MCS/MRC	As above	0
Fish use monitoring manuals	Resort fish landings protocols Night fishing data collection protocols & data sheets Household surveys questionnaire	MCS/MRC		0
Poster	Reef fish	MRC		0
Billboard & Poster	Grouper fishery	MRC		
Powerpoint presentations	Fishwatch Maldives Darwin Reef Fish Project	MCS/MRC		0
Reports	Sharkwatch	MRC/MCS	As above	0
Reports	Fishwatch	MCS/MRC	As above	0
Report	Grouper Workshop Report 2011			
Report	Grouper populations & sustainable yield	MCS/MRC		0
Fishery Review	Maldives Grouper Fishery Review 2011	MRC/MCS	MCS website	0
Fishery Review	Reef Fish – with Management Recommendations	MRC/MCS		
Fishery Review	Marine Aquarium Fishery	MCS/MRC		
Management Plan	Grouper Management Plan	MCS/MRC	MCS website	0
Management Plan	Aquarium Fishery Management Plan	MCS/MRC		

Publication Proceedings of the International Coral Reef Symposium	Maldives Sharkwatch: M. Ushan, E Wood, M Saleem, S Sattar 2012	MCS/MRC		0
Publication Proceedings of the International Coral Reef Symposium	Management of the grouper fishery of the Maldives. S. Sattar, A Najeeb, F. Islam, M. Shidha Afzal, E. Wood 2012	MCS/MRC		0
Educational colouring book	The adventures of Anees the Anemonefish	MCS/MRC		0
Magazine article	Taking stock and taking action on Maldives reef fisheries	MCS/MRC		0

Note:.
Digital copies provided. Hard copies for all items available at cost price of printing and postage
MCS website: http://www.mcsuk.org/conservation_in_action/Coral+reefs/Maldives/Maldives

Annex 6 Darwin Contacts

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Partner 2 etc.	
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