Darwin Initiative for the Sustainable Use of Sea Cucumber in Egypt

Annual Report 2004

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Darwin Initiative for the Survival of Species

Annual Report

1. Darwin Project Information

Project Ref. Number	*162/10/027*
Project Title	*Darwin Initiative for the Sustainable use of Sea Cucumber in Egypt*
Country(ies)	*Egypt*
UK Contractor	*Department of Biological Sciences, University of Hull*
Partner Organisation(s)	*Suez Canal University, Egyptian Environmental Affairs Agency, Red Sea Governorate,*
Darwin Grant Value	*£160, 700*
Start/End dates	*October 2001 – October 2004* *Extended to March 2005*
Reporting period (1 Apr 2003x to 31 Mar 2004) and report number 3	*October 2001 – April 2002*
Project website	*None*
Author(s), date	*A. J. Lawrence*

2. Project Background

The commercial exploitation of marine invertebrates is currently receiving increasing attention. Part of this expanding sector includes the sea cucumber fishery. Unfortunately, this fishery, known as Beche-de-mer or Trepang, has a history of over-exploitation and collapse. The pattern of the fishery is to mine out an area in a few years and then move on leaving behind a disrupted and impoverished environment. The fishery has collapsed throughout the Indo Pacific with many species now commercially extinct. Several countries have recently opened sea cucumber fisheries and experienced a 2 year cycle of expansion followed by rapid decline in export volume through over-fishing, highlighting the need for management of the fishery.

Egypt had opened a sea cucumber fishery in 1999. However, due to the support of the Darwin Initiative through this project, The Red Sea Governerate placed a ban on sea cucumber fishing until a stock assessment and management plan could be prepared. The aim of this was to try to develop the fishery in a sustainable manner. The project incorporates the whole of the Red Sea coastline of Egypt. In addition to developing a sustainable fishery, the project will provide data to Egypt's National Biodiversity Unit for inclusion in its National Biodiversity Strategy.

3. Project Purpose and Outputs

The aim of this project is to develop a sustainable sea cucumber fishery along the Egyptian Red Sea coast. This is being achieved through the completion of 4 principal objectives:

- First, to complete a fishery stock assessment, including baseline data on sea cucumber population dynamics and prepare a fishery management plan.
- Second, to develop a pilot mariculture system for sea cucumber in the Red Sea, to restock depleted reef areas and evaluate the feasibility of the process as a direct source of sea cucumber/ income generation for small community based mariculture systems
- Third, to examine the potential of the main species of farmed sea cucumber as a source of bioactive substances of potential medical benefit
- Fourth, to develop and run training courses in stock assessment and mariculture to build capacity in Egypt to continue the work beyond the period of funding.

The full list of objectives, including outputs, activities and measurable indicators are shown in the project logical framework (Appendix 1).

The objectives of the project have not changed over the last year. However, due to initial delays there has been a slight modification to the operational plan. These changes have been discussed and approved by the Darwin Secretariat.

In addition, the Operational Plan has been modified by the University of Hull's offer to fund a third year to upgrade the MSc studies in stock assessment and bioactive substances to PhDs. This has been approved by the Darwin Initiative.

Furthermore, the project partners were invited to attend and present data at a UNFAO workshop on Advances in Sea Cucumber Aquculture and Management in China (October 2003) which was again approved by the Darwin Initiative.

Finally, given the initial delays in the project, a request was made to the Darwin Initiative for an extension to the project deadline. This again was approved by the Secretariat with a new deadline of March 2005. This agreement included the postponement of the Final Report to March 2005, but also the addition of a third Annual Report for April 2004.

3. Progress

Briefly, following the initial delays (highlighted in previous reports) progress to the beginning of this reporting period had been good. An area survey of the Red Sea coast of Egypt was in progress as part of the stock assessment. In addition, a seasonal survey of a site containing good numbers of one of the commercial species had been initiated. Within the bioactive substances aspect of the project, samples from 11 species of sea cucumber had been collected and transferred to Hull University. The student engaged in this aspect of the work was undergoing intensive training in the development and use of a series of bioassays to test for activity against bacteria, fungi, and protozoan parasite and cancer cell lines. Preliminary data was beginning to be produced in relation to this. With regard to the mariculture work, the decision had been taken to rent space at the Haraz Hatchery on the Suez Canal. The advantage of this decision was that all facilities for maintenance of brood stock, spawning, larval rearing and grow out were all available. Initial spawning trials with one of the commercial species, *Actinopyga mauritiana*, together with asexual reproductive techniques had been attempted.

Progress over the last year and against the baseline timetable has mostly been very good. Both the stock assessment and bioactive substances components of the project have made very good progress. However, problems continue to arise in the mariculture study. Specific progress includes:

- **Stock Assessment:**

The Area Survey of the Red Sea coastline is mostly completed, with the exception of a final visit to the border with Sudan. A Seasonal and Monthly Survey of *Actinopyga mauritiana* has been completed from which a number of fishery related statistics are currently being generated. In addition, an Interview Survey of the Fishery has been completed which has provided useful additional information on catch, target species and other socio-economic issues (Additional Output).

A complete species reference collection has been set up in Suez Canal University and a species list prepared. A draft field guide has been produced and is currently undergoing revision. A fishery management and monitoring plan is currently being drafted. The distribution of each species is being mapped using a GIS system based at the EEAA Hurgada offices and with the support of the EEAA GIS Unit.

Preliminary results of the survey, primarily in relation to the commercially important species were reported at a UNFAO workshop in China and CITES technical meeting in Kuala Lumpur (Additional Outputs).

- **Bioactive Substances:**

Work in this area is progressing as originally outlined. Phases 1 and 2 are complete and Phases 3 and 4 (extract separation and testing of biological activity) are on-going. Training in preliminary bioassay methods against bacteria, fungi, protozoan and cancer cell lines was completed and initial screening of extracts from 11 species of sea cucumber completed. There has been no additional slippage since that at the start of the project.

- **Mariculture Work:**

Due to the over-fishing of stocks in the region, the decision was made to work with *Actinopyga mauritiana*, a lower value species but for which broodstock could still be collected. Maintenance and growth of the brood stock at Haraz Hatchery is being assessed. The reproductive cycle of *A. mauritiana* has been determined and spawning trials have been performed. In addition, asexual propagation methods have been attempted. Results of these trials were presented as part of a paper at UNFAO workshop. Due to changes in availability of a student from Suez Canal University the decision was taken to build Mr Wael Hefny's (EEAA Ranger) MSc into the project to examine aspects of the mariculture work.

However, slippage in this aspect of the project is continuing. The biggest single problem has been in the collection of broodstock. *Holothuria scabra*, the most valuable and preferred species for aquaculture and for which there is published literature has not been available because of its complete over-exploitation in the field. Consequently, *A. mauritiana*, a lower valued species and one not used extensively in aquaculture has had to be used. There is little information on the culture of this species.

- Project achievements during the last year include

Stock Assessment Survey

Area, seasonal and monthly surveys of stocks were completed during 2003. Survey methods included belt transects and CPUE estimates. A total of 160 sites have been

surveyed from the north to south. Surveys were performed on reef flats, and in the depth ranges 5-10m, 10-15 and 15-20 m. Species were collected for identification and commercial species identified, counted and measured. A total of 32 species have been identified. Seven are described for the first time in the Red Sea, one is described for the first time in the Indo-Pacific/Red Sea and one identification is outstanding and possibly a new species. Habitat was classified as: sand, coral, and seagrass. In addition, fished and un-fished areas have been surveyed and compared.

Briefly, we have now been able to map the ranges of each species along the coast and identify depth and habitat preferences. Total numbers of commercial species per hectare have been estimated for the main commercial species and compared with published densities. In addition, total stocks have been estimated (See UNFAO paper, Appendix 2, CITES presentation, Appendix 3).

The results indicate that the most highly valued commercial species have been severely over-exploited although not to the degree seen in other parts of the Indo Pacific. As the most highly valued species have become harder to find, other less valuable species have also been collected and are, themselves, now under extreme pressure. Interestingly, we have also found populations of *A. mauritiana* in sea grass beds in some areas. This is surprising, given the species is only found on coral reef crest areas. Whether, this represents the species exploiting habitat left vacant by the loss of other species can only be hypothesised. However, in other areas we have seen changes in community structure as a result of over-fishing.

In addition, at many of the sites, open interviews have been conducted with local fishermen and traders to gain a better insight of the fishery. Results from this have been reported in the previously cited Appendices 2 and 3. Initially, the fishery was based on trawlers in the south of the country which were collecting *Holothuria scabra* (the most valued species). As the fishery expanded, the fishing techniques moved increasingly from trawlers to hand collecting by divers.

Bioactive Substances Study

Training has been completed for the second student in bioassay techniques for candida, leishmania, bacteria and breast cancer cell lines. Over 120 bioassays have been performed on crude extracts from 11 species. Based on results from this, 4 species were selected for further detailed analysis.

The student then returned to Egypt to collect a large number of individuals of the 4 species showing greatest activity for sample purification and identification. Over 1 kg of each species was collected and preliminary extractions performed in Egypt.

Extracts returned to UK and secondary extraction of the samples is currently being performed. Partitioning of the crude extract into hexane, butanol and water soluble fractions has been performed. At each stage of the purification procedure activity confirmation assays against the yeast *Candida albicans* are performed to ensure that activity can still be detected. In addition, further confirmation of biological activity has been tested using Thin Layer Chromatography and an overlay Assay.

Further extraction of the samples is currently being performed by a combination of Liquid Chromatography and HPLC with continued testing of all isolated chromatographic peaks. Details of the methodologies and results will be presented shortly in a project progress report which will be sent to the Darwin Secretariat.

Briefly, we have found little activity against bacteria. However, we have found significant anti-fungal activity against *Candida albicans* and *Trichosporon beigelii*.

Extracts from 3 species have shown significant activity against the protozoan parasite Leishmania and high anti-tumor activity was detected in extracts from a further 3 samples. Preliminary results from TLC and column chromatography suggest that the active compounds are in the polar fraction.

A further significant observation from this work is the variation in bioactivity seen within the same species collected form different sites (northern and southern Red Sea Egyptian coasts). The latter may reflect the importance of the environment on the production of secondary metabolites. It is known that structural variability is a characteristic phenomenon in sea cucumber glycosides with each species exhibiting its own typical pattern of saponin glycoside derivatives. However variability in these derivatives within individuals of the same species is not known and has not, until now, been previously reported.

Mariculture Study

The Mariculture Study is on-going but currently showing slower progress than the other aspects of the project because of a number of technical problems. Mr Wael Hefny, an EEAA Ranger, has been registered for an MSc at Hull University. The study will focus on spawning trials of *A. mauritiana* and *H. scabra* (if possible) as well as investigate the impact of sea cucumber removal on habitat quality. In addition to Haraz Hatchery, facilities at the National Oceanographic Institute, Hurgada, are being used for trials.

The biggest problem has been collection of broodstock for the mariculture study. The only tropical species successfully cultured and with published methods is *Holothuria scabra*. This is also the most highly valued commercial species. However, this species has been fished to very low numbers in the Red Sea and it has proven impossible to collect enough animals to act as a broodstock. Consequently, we have had to use *Actinopyga mauritiana* as an alternative. There is very little published information on culture of this species, primarily because it has a much lower commercial value. In addition, these too are becoming harder to collect and this is having an impact on the timetable to the mariculture study.

Reiner Pitt, a consultant with the World Fish Centre, was invited to Egypt by EEAA for a tour of potential culture facilities and to offer advice on best practice. Mr Pitt is a recognised expert in the culture of *H. scabra*.

The reproductive cycle of *A. mauritiana* has been determined through examination of gonad somatic index and oocyte size changes. This study has confirmed a sex ration of 1:1, reproductive season and minimum size at maturity for this species. A large number of spawning trials have been attempted with *Actinopyga*. However, up to date these have proven unsuccessful. We have, however, induced spawning behaviour, including adoption of the pre-spawning cobra position (see UNFAO publication, Appendix). In addition, and in part to increase the size of broodstock, a method of asexual propagation has been attempted. Whilst this has shown some partial success, it is recognised that this does not offer a feasible alternative to successful spawning and rearing of animals.

- The design of the project has been enhanced in a number of ways during the last year. For example:

The Department of Biological Sciences, University of Hull has offered to upgrade Mohammed Ismail's project for submission as a PhD. The Department is willing to provide tuition fees and consumables for the third year. This has been approved by the Darwin Initiative but is yet to be approved by his home Department.

The Department of Biological Sciences, University of Hull has also offered to upgrade Mr Rafat Afifi's project (Bioactive Substances) for submission as a PhD. The Department is willing to pay tuition fees for the third year of the study. This has been approved by the Darwin Initiative.

As part of the on-going work the EEAA invited Mr Reiner Pitt, to visit a number of potential mariculture sites in Egypt and to report on their suitability. Reiner Pitt is one of the leaders in the field of mariculture, notably of *Holothuria scabra*.

The UNFAO invited the Team to a workshop in China on Developments in Mariculture of Sea Cucumber. Two papers were presented by the Team (Appendices 2 and 4). In addition, the group benefited from meeting other world leaders in the field of mariculture and particularly from a study tour of two mariculture facilities in China. The species cultured in China is the temperate *Stichopus japonicus*. However, basic techniques can still be transferred.

- Workplan and Timetable to the End of the Project

	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Continued elucidation of bioactive substances										
Howaida - Interim Mariculture report										
Complete A. mauritiana spawning attempts (As&H)										
Overseas training in mariculture (Wael)										
Attempt collection H. scabra brood stock (Ashraf)										
Attempt H. scabra spawning & culture (Wael & H)										
Gain permissions for trawl survey in south (Ashraf)										
Trawling Survey in Foul Bay (Team?)										
Action Plan for Management of H. scabra (Ashraf)										
Feeding/ bioenergetics study (Wael)										
Study changes in quality thro processing (Howaida)										
Get Field Guide Published (Andrew/ Mohammed)										
Complete FiSAT analysis of stock data (Mohammed)										
Finish Management and Monitoring Plan (Andrew)										
Stock survey paper (Andrew/ Mohammed)										
Actinopyga Reprodn paper (Andrew/ Mohammed)										
Actinopyga samples for DNA (Ashraf)										
Final Mariculture Report (Howaida/ Ashraf)										
Mariculture Paper (Howaida)										
Darwin Half Year Report (Andrew)										
Darwin Final Report (Andrew)										
Final Meeting of Partners/ agree reports etc										
One day seminar/ dissemination of results										
Produce a Public Awareness Booklet for Egypt										
Merlin updates on meeting targets (AJL, H, Ash)										

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

Whilst we have not to now formally responded to the previous review, this has been discussed by the project management committee which was overall, pleased with the very positive response of the reviewer. In response to the specific issues raised by the review:

- All major items of equipment are insured by Suez Canal University in Egypt

- The group were aware of the work Reiner Pitt. He has visited Egypt and offered advice on aspects of the mariculture work.
- Aspects of GIS work are currently being performed by EEAA staff at the GIS Unit, Hurgada. However, we still hope to train an additional person in GIS.
- There has been a delay in the completion of the Management Plan, partly due to initial slippage. However, this has given the project time to highlight key issues, notably in the need for additional monitoring which will be built into the plan.
- Mr Wael Hefny (EEAA Ranger) had originally been registered by Hull University to complete a research MSc. The scope of this project has now been broadened to incorporate aspects of the mariculture study

6. Partnerships

The collaboration between the partners has continued to strengthen. One minor problem related to the availability of Mohammed Diaa to undertake the mariculture work. Consequently, this has been mostly performed by H. Gabr and A. Ibrahim. However, this has been expanded by incorporation of more of the mariculture work into an MSc being undertaken by EEAA Ranger Wael Hefny.

The cooperation of the Egyptian Environmental Affairs Agency has proven particularly beneficial in relation to provision of facilities, manpower and equipment for stock assessment surveys. The EEAA also supported the visit of Reiner Pitt to Egypt and have released one of their Rangers to help in the mariculture study.

The UK partner (University of Hull) has, in recognition of the outputs from the stock survey and bioactive substance aspects of the project, offered to fund a further year for each student to complete PhDs.

The Red Sea Governorate has continued to give its full support to the project, with the Governor writing a letter to the GAFR in support of a continuance of the ban on fishing of sea cucumber due to end in December 2003.

- The project is increasingly collaborating with similar national and international initiatives.

Within Egypt and through the collaboration of the EEAA, the project has developed links with a USAID project currently ongoing in Egypt called the Egyptian Environmental Policy Program. Some of the data collected on the sea cucumber fishery has been presented in a broader fishery report as part of this project. The link between the projects is ongoing.

Internationally, a number of links have been developed and are resulting in on-going collaborations. For example, a link has been established with Dr Yves Samyan (CBD National Focal Point, The Royal Institute of Natural Science of Belgium). Dr Samyan is currently offering advice and confirmation of some species Identifications. The RINSB may fund a short visit by M. Ismail to Belgium to complete the taxonomy of the one outstanding species yet to be identified to species level.

In addition, a link has also been established with Dr Sven Ulthike, from The Australian Institute of Marine Sciences (AIMS) regarding distribution and taxonomy of *H. fuscogilva*. The species collected in the Red Sea appear slightly different to those described in the Indo Pacific. We have sent photographs and samples which are being

used in a molecular genetic analysis of the species across their global range being performed by Sven Ulthicke's group.

A. Lawence was invited to a CITES technical workshop in Kuala Lumpur to consider the potential listing of sea cucumber under the convention (March 2004). He gave a report on the status of the fishery in Egypt and was involved in production of a technical report which was submitted to the Animals Committee of CITES for consideration prior to the meeting of the Parties later in 2004. The outcome of the report and discussions is, therefore, yet to be confirmed.

As a result of the status reports presented both at the UNFAO workshop in China (November, 03) and the CITES technical workshop in Kuala Lumpur (March, 04), the UNFAO have invited the project apply for funding to continue to study though a FAO Technical Cooperation Project. The partners are currently drafting an application for this.

Again as a result of both workshops, contact has also been made with the World Fish Centre, and the feasibility of running a workshop on mariculture issues in Egypt is being considered. In addition, the UK partner met staff from Tasmania Seafoods P/L, which is active in the adoption of sustainable sea cucumber fishery practices in Australia. The company have requested help in developing a sustainable sea cucumber fishery, with an initial stock assessment and continued monitoring, in the British Indian Ocean Territories, for which we are currently exploring funding opportunities. A further link with a second company, Bluefin Seafoods Pty, Australia, which is active in commercial mariculture of *H. scabra* is developing and might offer future opportunities in specific skills training.

Further spin out of the current project include the UK partner being chosen to supervise a 2-year Ford Foundation funded study to examine the impact of sediment on the coral reefs in and around Hurgada. The study is being performed by a Senior Ranger at the EEAA Hurgada office.

7. Impact and Sustainability

The profile of the project has been high in Egypt. The project has developed links with the GAFR, and NGOs including the Hurgada Environmental Protection and Conservation Association (HEPCA) and the Red Sea Diving, The Regional Organisation for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA) and Watersport Association (RSDWA) all of which has raised awareness of the project within Egypt.

Regarding impact and sustainability, preliminary data from the project lead to the re-instatement of a ban on the fishery to December 2003. Further assessment of the status of the fishery has lead to officials from the EEAA requesting an extension of the ban to allow stock recovery. This request was supported and endorsed by The Red Sea Governorate in a letter to the General Authority for Fisheries Resources and has lead to an extension to the ban to the end of 2005. However, an illegal fishery continues to operate in the region. In addition, Dr Fouda, Director of Conservation at EEAA, is hoping to attend the CITES meeting later in 2004 to discuss potential listing of certain species of sea cucumber under the convention.

Increased capacity includes the training of 5 EEAA Rangers in the identification of the main commercial species of sea cucumber and survey techniques for future monitoring of populations.

The exit strategy is continuing to evolve but includes the future employment of M Ismail and R Afifi within the Department of Marine Sciences, Suez Canal University where they will be able to continue their research in their respective disciplines.

It also now includes the training of Wael Hefny, a EEAA Ranger, in mariculture and particularly spawning and rearing techniques. Mr Hafny will then be able to pass on these skills and will be central to a TCP application which will be submitted by the Egyptian government to UN FAO to further develop mariculture systems in Egypt together. The application will also develop a Regional Strategy for the conservation and sustainable use of commercial species between Egypt, Sudan and Eritrea.

A particular concern to the project is that monitoring of commercial sea cucumber stocks should continue beyond the lifetime of the project. Whilst EEAA Rangers have been trained for this, it is recognised that funds to support this monitoring are limited. Consequently, the project partners are also currently exploring potential avenues for additional funding to support such a monitoring programme.

8. Post-Project Follow up Activities

As noted in previous sections, the intention is to apply to the UNFAO for additional funding to support the embedding of a monitoring programme into the activities of the EEAA and to further develop a mariculture system for sea cucumber in Egypt based around the training of Wael Hefny. This has the full support of Dr M. Fouda, Director of Conservation, EEAA who wishes to take it further and develop a Regional Partnership and strategy for sustainable use of Sea Cucumber in the Red Sea. In this, Dr Fouda anticipates that the Egyptian experts and EEAA Rangers, trained through the initial Darwin and future FAO projects, will transfer skills and technology to partner institutions in Sudan and Eritrea. It is here that future Darwin Initiative participation may be sought, in the set up of a Regional Network and through the development of training and technology transfer courses, visits and exchanges. All of this clearly falls within the scope of Darwin Initiative projects, building, as it will, partnerships and capacity for the sustainable exploitation and conservation of resources. In the longer term, Dr Fouda is thinking of an East Coast of Africa Regional Strategy with possible funding through the CBD.

9. Outputs, Outcomes and Dissemination

In most aspects the project outputs are reasonably on schedule. Whilst field guides and reports are not yet published, we do have completed drafts prepared. One area of slippage relates to the training of fishermen. This is due primarily to the delays in the mariculture study. It is hoped that these can be achieved in the final year of the project. The second area of slippage is in the production of scientific papers. Again this relates to the initial delays in the gathering of good quality controlled data. It is anticipated that a number of papers will be submitted through the next year.

Dissemination in the host country has been limited this year but has included dissemination via meetings between EEAA and DEFRD, correspondence between the Red Sea Governorate and DEFRD and a short workshop held by Suez Canal University. Future dissemination, beyond the time of the project is likely to be coordinated by EEAA who will also continue any future monitoring.

Table 1. Project Outputs (According to Standard Output Measures)

Code No.	Quantity	Description
1A	2	Two Egyptian Students invited to submit PhD theses
2	1	One Egyptian student to submit a research MSc thesis
8	8	A total of 8 weeks have been spent in Egypt by UK staff on project related work
11A	2	Two refereed papers published in UNFAO book
13A	1	One complete species reference collection set up in Egypt with a second partial collection in Hull
14B	6	Three papers presented (2 at UNFAO, 1 at CITES)
		One paper at workshop in Egypt, one poster in Vancouver and one poster at Darwin Fair as part of Biodiversity Week.
15A	1	One national press release sent out in Egypt
15C	1	One press release produced in UK
18D	1	One local news feature on BBC Look North
19A/B	1	One national radio interview in Egypt and whole of Africa for BBC World Service – Africa Today
19D	1	News interview for BBC Radio Humberside

Table 2: Publications

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (e.g. contact address, website)	Cost £
FAO technical report article	Lawrence, A.J., Ahmed, M., Hanafy, M), Gabr, H., Ibrahim, A and Gab-Alla, A. (2004) Status of the Sea Cucumber Fishery in the Red Sea – The Egyptian Experience	UN FAO		Not known
FAO technical report article	H.R. Gabr , A. I. Ahmed, M. H. Hanafy, A. J. Lawrence M. I. Ahmed and S. G. El-Etreby (2004) Mariculture Of Sea Cucumber In The Red Sea - The Egyptian Experience. Both in: A. Lovatelli, C.Conand, S. Purcell, S. Uthicke, J-F Hamel & A. Mercier (Eds) 2004 Advances in Sea Cucumber Aquculture			

	and Management			Free
SPC Beche-de-Mer Bulletin	Titles and authors as above Beche-de-Mer Issue 19, Jan 2004	SPC	www.spc.int/coastfish/news/BDM/19/ASCAM.pdf	Free
CITES Technical Report to the Animals Committee	Lawrence, A.J., Ahmed, M., Hanafy, M, Gabr, H., Ibrahim, A and Gab-Alla, A. (2004) Status of the Sea Cucumber Fishery in Egypt. –	CITES	CITES Doc AC20 Inf 14	

10. Project Expenditure

Table 3: Project expenditure during the reporting period (Defra Financial Year 01 April to 31 March)

Item	Budget (please indicate which document you refer to if other than your project schedule)	Expenditure	Balance

Spend on conference attendance is higher than budgeted due to travel to China for UNFAO workshop. However, this was agreed with the Darwin Initiative in advance. The advances to Egypt include cost for salaries, consumables and field expenses. The salary component can not be specifically taken out and added to salaries at this time but the combined costs of "others and salaries" is currently still within budget

11. Monitoring, Evaluation and Lessons

Monitoring and management of the project is still primarily via Merlin (an internet system which allows all of the named participants in the project to correspond and communicate on a regular basis). The project participants, and Management Committee, are able to share and disseminate information, provide training and monitor progress against predetermined milestones and the logistic framework via the system. In addition there have been a number of meetings between the Project Coordinators in Egypt, the UK and China.

That the outputs are contributing to the project purpose is highlighted by the re-instigation of a fishery ban during 2003 and the agreed continuance of the ban on the fishery to the end of 2005 whilst any evidence of stock recovery is determined.

Indicators of achievement include progress reports being prepared for each of the main topic areas of the project, the offer to upgrade two of the studies to PhD (through the University of Hull) and our invitation to significant international events related to sea cucumber conservation, aquaculture and management.

Regarding lessons learned, the main issue has related to the difficulties around mariculture of a species in an area where it has not been previously attempted particularly when the preferred species is not available. One way would like to overcome this problem is by sending the mariculture student to an overseas facility in which sea cucumber are being successfully spawned, larvae reared and juveniles grown out, so that specific skills can be learned and later applied back in Egypt.

12. OPTIONAL: Outstanding achievements of your project during the reporting period

Of particular note during the current reporting period has been the response of international audiences to information presented from the stock assessment study. One aspects of good practice, raised by participants was our use of data showing an increase in diver related accidents as a surrogate for fishing effort. The fact that our survey methods included habitat preference and depth preference details for each species, whilst not unique, was highlighted as a fundamental that should ideally be built into all future sea cucumber population analyses, and the fact that we could show a reduction in species landed by fishing method, over time was very well received at the CITES meeting because so few studies are able to show this.

In addition, whilst at a reasonably preliminary stage the bioactive substances project has produced very encouraging information and appears unique in identifying intra-specific variation in bioactivity in one species across its range in the Red Sea. This may lead to very interesting future developments.

■ **I agree for ECTF and the Darwin Secretariat to publish the content of this section**