

Darwin Initiative

Annual Report

1. Darwin Project Information

Project Ref. Number	14-048
Project Title	Galapagos Coral Conservation: Impact Mitigation, Mapping and Monitoring
Country(ies)	Ecuador
UK Contractor	University of Edinburgh
Partner Organisation(s)	Charles Darwin Research Foundation, Conservation International, Galapagos National Park Service, WildAid
Darwin Grant Value	£150,000
Start/End dates	May 2005 / April 2008
Reporting period (1 Apr 200x to 31 Mar 200y) and annual report number (1,2,3..)	1 Apr 2005 to 31 Mar 2006 Annual Report Number 1
Project website	http://www.geos.ed.ac.uk/research/globalchange/group4/Galapagoscoral.html
Author(s), date	Terence Dawson, Stuart Banks, Scott Henderson, Godfrey Merlin, 12 th May 2006

2. Project Background

- Briefly describe the location and circumstances of the project and the problem that the project aims to address.

Wolf and Darwin islands form a distinct and isolated biogeographic zone in the Galapagos Islands that supports a high level of biodiversity, including priority conservation endemic corals and associated species, subject to extreme 'natural' climatic and anthropogenic pressures. The extreme climatic fluctuations under El Niño events in the region are particularly damaging for coral populations - extensive coral reefs were reduced by 97% in 1982-83 and further compounded to 99% losses in 1997-98. Subsequent surveys show that Wolf and Darwin harbour >95% of the coral species now found in the Galapagos Marine Reserve (GMR) including rare corals (eg. Leptoseris Sp.) that may well become locally and indeed globally extinct, and demand special attention to their conservation. Although Galapagos coral research has been carried out previously, this project constitutes the most comprehensive study using innovative mapping techniques undertaken to date in the remote northern islands. In addition to the comprehensive establishment of baseline

biodiversity data sets, the project will actively engage with the fishing and tourism industries for improved management of the marine environment through capacity-building of local tourism and diving guides and fishers, and the establishment of permanent mooring buoys to avoid boat anchor damage.

3. Project Purpose and Outputs

- State the purpose and outputs of the project. Please include your project logical framework as an appendix and report achievements and progress against it (or, if applicable, against the latest version of the logframe).

The purpose of this project is to assist the Ecuadorian Government, through the Galapagos National Park, in protecting the last remaining extensive Galapagos coral reefs of the northern islands. This will be achieved through the following outputs:

- 1. Improved baseline scientific knowledge of coral reefs and associated biodiversity of the northern Galapagos Marine Reserve;*
- 2. Reduced coral damage due to the installation and establishment of permanent boat moorings;*
- 3. Through training, workshops and other capacity-building exercises, increase knowledgeable stakeholders committed to participating in coral monitoring and conservation.*

Logical framework attached.

- Have the outputs or proposed operational plan been modified over the last year, for what reason, and have these changes been approved by the Darwin Secretariat? (Please note that any intended modifications should be discussed with the Secretariat directly rather than making suggestions in this report).

The only planned significant change to the details of the original project proposal has been in the purchase of the mooring buoys and associated equipment as a single lot (rather than to purchase individual mooring equipment as a staged activity over the lifetime of the project), to minimise paperwork associated with importation of goods and costs of transportation. This had been approved by the Secretariat, with associated funding brought forward into the 2005-2006 financial year..

4. Progress

- Please provide a brief history of the project to the beginning of this reporting period. (1 para)

The project was initiated on 1st May 2005. However, the project builds upon an earlier DI project (No. 6/174: Revision of the Galapagos Marine Management Plan), which had flagged the conservation priority of the Wolf/Darwin coral reefs.

- Summarise progress over the last year against the agreed baseline timetable for the period and the logical framework (complete Annex 1). Explain differences including any slippage or additional outputs and activities.

Deployment of mooring equipment has been delayed by 2 months due to importation paperwork delays and the availability of a suitable boat platform to handle the engineering requirements of installation.

- Provide an account of the project's achievements during the last year. This should include concise discussion on methodologies and approaches by the project (e.g. research, training, planning, assessment, monitoring) and their consequences and impacts as well as results. Please **summarise** content on methodologies and approaches, and, if necessary, provide more detailed information in appendices (this may include cross-references to attached publications).

The first training workshop for local stakeholders was conducted in August 2005 (reported elsewhere). The project undertook the first expedition to the Galapagos northern islands in September 2005. We were able to coincide this excursion on the back of an 'Eastern Tropical Pacific Marine Protected Areas' meeting held in Galapagos and organised by Conservation International. We were able to invite and draw on significant expertise in marine sciences from international scientists based in Columbia, Venezuela and Australia, as well as have representation from UNESCO. Prior to the trip, we established a new set of monitoring and mapping protocols, derived from the ReefCheck and AGRRA (Atlantic and Gulf Reef Rapid Assessment) methodologies, but specifically adapted for Galapagos marine habitats. During the trip lasting 10 days, an extensive inventory of biodiversity and physical data was collected and subsequently entered onto a database, to be held by CDRS. Potential mooring sites were also surveyed, with a report produced (attached). 2 MSc projects were identified and students were recruited. 3 Ecuadorian students (attached with CDRS) were trained in coral identification. They were trained in coral specific monitoring with 2 field trips to share experiences in Los Roques, Venezuela, focusing upon identification methods in the first case and diseases in the second instance. Regional experts from Venezuela and Costa Rica in particular have been instrumental in their support and formation of these individuals. The Corals of Galápagos' field guide was published. Low-impact Mooring equipment was purchased (to be deployed at a later date). Mooring buoys are currently being painted with the Darwin Initiative logo.

- Discuss any significant difficulties encountered during the year and steps taken to overcome them.

None

- Has the design of the project been enhanced over the last year, e.g. refining methods, indicators for measuring achievements, exit strategy?

The development of a working sustainable fisheries and zoning scheme is proving difficult due to the strength of representation of the fishing communities, with strong political support and uncompromising attitudes. Indeed, it is now widely recognised by all stakeholders that the lobster and sea cucumber fisheries have effectively collapsed, and there is now significant increasing illegal shark fishing (shark finning) for the Asian markets, which is proving a challenge to address. CI is investigating a suite of packages for reducing numbers in the fishing sector including the potential for fishers to undertake retraining in support of the tourism sector.

- Present a timetable (workplan) for the next reporting period.
 - Second research cruise completed (May 2006)
 - 6 moorings deployed by GNPS at the northern islands; scientific and participatory monitoring protocols finalized; data from trip 2 in GIS and databases. Year 1 Evaluation and Year 2 Work-plan meeting held (planned for July 2006).
 - Field guide revised including participatory monitoring protocol and mooring maintenance checklist.

- Workshop conducted to teach participatory monitoring protocol to stakeholders and GNPS staff for immediate implementation.
- Stakeholder survey conducted to establish baseline knowledge (move to next financial year).
- Boat contracted for 3rd research cruise; participants and objectives finalized - Research methods orientation session with stakeholders
- Third research cruise finalized (planned for January 2007).. Participatory monitoring protocols are being implemented by targeted stakeholders and datasheets are being delivered to GNPS and CDRS for integration into database.

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

- Have you responded to issues raised in the review of your last year's annual report? Have you discussed the review with your collaborators? Briefly describe what actions have been taken as a result of recommendations from last year's review.

Not Applicable

6. Partnerships

- Describe collaboration between UK and host country partner(s) over the last year. Are there difficulties or unforeseen problems or advantages of these relationships?

The partnership arrangement has worked very well, with a high degree of commitment from each of the partners. The principal local collaborators (specifically, the Charles Darwin Foundation, WildAid and the Galapagos National Park) have worked cooperatively with each other for many years, and this has helped significantly in resolving minor difficulties in undertaking the project. Conservation International (CI) has established a relatively new but welcome permanent presence in the Galapagos islands (through Scott Henderson) with a focus on marine conservation and has been successful in finding financial co-support to providing excellent local facilities (boat hire, etc), as well as engage a wider international and regional scientific community in support of the project through their SEASCAPE Eastern Tropical Pacific marine corridors programme.

Has the project been able to collaborate with similar projects (Darwin or other) in the host country or other regions, or establish new links with / between local or international organisations involved in biodiversity conservation?

The project has established a working relationship with the Darwin project No. 12-021 to share information and data to support high quality research, and 'best practice' approaches to managing marine protected areas. Scott Henderson (host country Project Co-ordinator) attended and presented our project activities at the Darwin project (12-021) conference and workshop "Resource Management and Conservation in the Las Perlas Special Management Zone", which was held from March 29th-31st, 2006 at the Smithsonian Tropical Research Institute (STRI), Panama City. A reciprocal arrangement has been made for Dr Hector Guzman (STRI) and other local marine scientists in central and Latin America to visit Galapagos in the summer 2006 to join our expeditions and to attend a special red-listing workshop for corals and macro algae in the Eastern Tropical Pacific, coordinated by CI. Two International tourist boat operators (Aggressor Fleet and Quasar Nautica) have become collaborators with our project and have committed matching funds to double up on the purchase of mooring equipment.

7. Impact and Sustainability

- Discuss the profile of the project within the country and what efforts have been made during the year to promote the work. What evidence is there for increasing interest and capacity for biodiversity resulting from the project? Is there a satisfactory exit strategy for the project in place?

Galapagos is very high on the conservation agenda of the Ecuadorian government, and Wolf and Darwin are all the more important given their significant economic importance to dive tourism, which is a rapidly growing subsector or the tourism sector worldwide. For the last 2 years a nine-organization alliance of NGOs has been working with the fishing sector and Ecuadorian Ministry of the Environment to identify ways to reduce fishing pressure in the Galapagos Marine Reserve. One option that has been tabled is the enlargement of the No Take zone around the northern islands in exchange for access to cheap credit and/or the creation of a social benefit fund of a value equal to the fishing value of the potential No Take areas at Wolf and Darwin. The scientific work produced by this project is providing the scientific basis for No Take zone creation and the placement of anchor moorings is an ideal kick-start effort to draw additional support from the dive tourism industry to provide additional moorings. These efforts have been closely coordinated with the Ecuadorian government (National Park Service) to ensure their full support. To date, promotion has been mostly limited to the provision of information to the fishing, guides and tourism sectors and in discussions with the Park Service and Ministry of the Environment. Inclusion of guides and fishermen on the trips, as well as the pre-trip workshop held in 2005 has increased both interest in conservation and improved capacity to undertake monitoring work. Evidence for increased interest includes our inability to accommodate the number of fishermen and guides interested in participating, whereas for the first trip we had difficulty securing participants. We anticipate that increased attendance at our next workshop will provide further evidence of increased interest.

The CDRS have presented the Darwin coral work to both locally and to international various student college and university groups as an example of integrated science in sensitive species and ecosystem management.

Regarding an exit strategy, we have already obtained commitments from dive operators to provide funding for additional moorings (funds in hand) and the Galapagos National Park Service has committed to deploying them in July 2006. The Charles Darwin Research Station has incorporated the coral monitoring protocol into their field agenda. We still need to obtain commitments from dive operators to implement the non-scientific protocol, and are confident that this will be forthcoming, especially from those providing funds for the additional moorings.

8. Outputs, Outcomes and Dissemination

- Explain differences in actual outputs against those agreed in the initial 'Project Implementation Timetable' and the 'Project Outputs Schedule', i.e. what outputs were not or only partly achieved? Were additional outputs achieved?

Aside from the re-scheduling of some activities to within one or two months of the original planned timescales, there has been, or there is anticipated to be, no significant changes in deliverables or outputs over the project lifetime.

- Provide details of dissemination activities in the host country during the year, including information on target audiences. Will dissemination activities be continued by the host country when the project finishes, and how will this be funded and implemented?

During year 1 we:

1. held a participatory workshop with fishermen and guides to inform them of the project's objectives and to take advantage of experts in marine conservation and coral ecology.
2. held meetings with the Galapagos National Park Service and independent tour operators to inform them of project objectives, provide updates on progress and to obtain commitments for additional support.
3. participated in a Darwin network meeting in Panama hosted by the Smithsonian Tropical Research Institute that included other past and present Darwin Initiative projects. We provided a review of objectives, progress, next steps and identified ways to share information and research staff time between projects to enhance them.

As results are coming in, we will increase our dissemination activities in years 2 and 3 to a wider public, in particular in Galapagos. We have written a funding budget into an existing grant from the Walton Family Foundation for this purpose. The activities will focus on highlighting the importance of Wolf and Darwin Islands and their conservation and the role this project has played in providing information and promoting cooperation.

- Please expand and complete Table 1. **Quantify** project outputs over the last year using the coding and format from the Darwin Initiative Standard Output Measures (see website for details) and give a brief description. Please list and report on appropriate Code Nos. only. The level of detail required is specified in the Guidance notes on Output Definitions, which accompanies the List of Standard Output Measures. Only the summarised totals after the end of your project will be recorded on the Darwin project database from your final report (the totals below will help you to keep track on a yearly basis).

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

Code No.	Description	Year 1 Total	Year 2 Total	Year 3 Total	Year 4 Total	TOTAL
4A/B	specialist training in coral identification, reef assessment, ecological monitoring	3				
6a	fishermen/dive guides receive training in pre-trip workshops, during research cruises	7				
8	PI field research, workshop and annual planning participation	7 weeks				
9	Plans corresponding to emergent MPA zoning criteria	3 (on-going)				
10	A pioneering field guide produced for Galapagos corals	1				

- In Table 2, provide full details of all publications and material produced over the last year that can be publicly accessed, e.g. title, name of publisher, contact details, cost. Details will be recorded on the Darwin Monitoring Website Publications Database. Mark (*) all publications and other material that you have included with this report.

Table 2: Publications

Type *	Detail	Publishers	Available from	Cost £
(e.g. journals, manual, CDs)	(title, author, year)	(name, city)	(e.g. contact address, website)	
<i>Book</i>	<i>'Corals of Galápagos'</i> <i>C. Hickman, Á. Chiriboga and W. Ober, 2006</i>			
<i>Report</i>	<i>'Establishment of Anchorage sites in the Galapagos Northern Islands', G. Merlen and S. Banks, 2005</i>		<i>CDRS, Galapagos</i>	<i>FOC</i>

9. Project Expenditure

10. Monitoring, Evaluation and Lessons

- Discuss methods employed to monitor and evaluate the project this year. How can you demonstrate that the outputs and outcomes of the project actually contribute to the project purpose? i.e. what are the indicators of achievements (both qualitative and quantitative) and how are you measuring these?

Stuart Banks (Head of science, Marine Laboratories, CDRS) and Scott Henderson (CI, local host project coordinator) have met on a regular basis throughout the year to review timetabling of Darwin Activities, and to ensure these integrate well into other scientific and management objectives of the Galapagos National Park and the CDRS. This information was reported back to Terry Dawson for review and endorsements on a 3-monthly basis. Notable activities, such as the workshops, expedition cruises and production of the field guide was planned well in advance of requirements to ensure coordinated and timely outcomes..

- What lessons have you learned from this year's work, and can you build this learning into future plans?

We have learned a number of important lessons including:

1. The degree of anchor damage is startling at some sites, and hence we need to move forward the deployment dates. We plan to deploy all 3 moorings in July 2006, rather than stagger deployment over time.

2. Marchena is not a good site for mooring deployment given its very open location. A more cost-effective solution is to work with the Park Service to establish a policy such that no boats anchor in the dive area, at all, but rather stand-by during diving at a safe distance. This will allow us to deploy all 3 moorings (plus an additional 2 provided by tour operators, in Wolf and Darwin).

3. Dive operations have intensified in Wolf and Darwin, and hence we need to deploy more than 1 mooring at each site to avoid anchor damage. This will be done in July 2006.

4. The research cruises serve as an ideal forum to discuss conservation issues in great depth from a number of perspectives, including those of international, national and local expert scientists and conservationists, guides, fishermen and crew members. On trip 2 we ran a highly successful lecture series with 1 hour presentations each evening on a range of topics.

These were attended by all and provoked an interesting exchange of views from the eclectic audience. This will be repeated on future trips.

5. Contrary to expectations, corals seem to be recovering quite well from past devastating events. International expert, Peter Glynn, has provided a report on his observations contrasting this year with the past 35 during which he has conducted coral research in Galapagos. The lesson learned is that with proper protection, corals in Galapagos may continue to recover well. This is additional reason to place all moorings this year to encourage maximum recovery before any future El Niño events.

6. There is a great deal of commitment and interest in Galapagos marine conservation from all stakeholders and visitors to the Galapagos islands, which we have not yet fully explored. Over the next year, we are committed to making concerted efforts to raise further interest and explore funding opportunities to raise the stakes in conservation success.

11. OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 words maximum)

*The initial surveys of the islands of Wolf and Darwin conducted during the project 1st expedition in September 2005 resulted in the re-discovery of a coral species that was thought to have gone extinct as a result of the 1982/83 and 1997/98 El Niño events. Several separate, but small colonies of the species *Gardineroseris planulata* was identified at the Wolf and Darwin island sites. This achievement was reported on the project web-site, the annual report of the Centre for Environmental Change and Sustainability (Annex) and the Darwin Newsletter, issue 6, page 5: 'Extinct' coral species is rediscovered in the Galápagos Islands.*

Production of a guidebook: 'Corals of Galápagos' field guide, 2006, Authors: Cleveland Hickman, Ángel, Chiriboga and William Ober (Annex)

Negotiating and purchase of 6 permanent mooring buoys for installation, instead of the original 3 planned - in partnership with Galapagos tourism-boat operators.

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

In this section you have the chance to let us know about outstanding achievements of your project over the year that you consider worth highlighting to ECTF and the Darwin Secretariat. This could relate to achievements already mentioned in this report, on which you would like to expand further, or achievements that were in

addition to the ones planned and deserve particular attention e.g. in terms of best practice. The idea is to use this section for various promotion and dissemination purposes, including e.g. publication in the Defra Annual Report, Darwin promotion material, or on the Darwin website. As we will not be able to ask projects on an individual basis for their consent to publish the content of this section, please note the above agreement clause.

Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2005/2006

Project summary	Measurable Indicators	Progress and Achievements April 2005-Mar 2006	Actions required/planned for next period
<p>Goal: To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but poor in resources to achieve</p> <ul style="list-style-type: none"> • The conservation of biological diversity, • The sustainable use of its components, and • The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources 			
<p>Purpose <i>(insert original project purpose statement)</i></p> <p><i>To assist Ecuador in protecting the last remaining extensive Galapagos coral reefs.</i></p>	<p><i>(insert original purpose level indicators)</i></p> <p><i>Amount of reef showing recovery from impacts originating from tourism and fishing, in particular those resulting from anchor damage.</i></p>	<p><i>(report impacts and achievements resulting from the project against purpose indicators – if any)</i></p> <p><i>Ongoing baseline surveys being conducted</i></p>	<p><i>(report any lessons learned resulting from the project & highlight key actions planning for next period)</i></p>
<p>Outputs</p>			
<p><i>(insert original outputs – one per line)</i></p>	<p><i>(insert original output level indicators)</i></p>	<p><i>(report completed activities and outcomes that contribute toward outputs and indicators)</i></p>	<p><i>(report any lessons learned resulting from the project & highlight key actions planning for next period)</i></p>
<p><i>1. Improved baseline knowledge of northern GMR coral reefs</i></p>	<p><i>1a. Number of species recorded at each site over current species lists</i></p> <p><i>1b. Number of anchor sites for which coral distribution maps are produced</i></p> <p><i>1c. % of reefs in anchorage areas that are mapped and inventoried</i></p>	<p><i>1a. Comprehensive inventories produced for corals, reef fish and macro invertebrates for the Wolf, Darwin and Marchena islands (ongoing research)</i></p> <p><i>1b/1c. Anchor survey report produced (Annex) and potential sites established</i></p>	

<p>2. Reduced coral damage due to the use of permanent moorings</p>	<p>2a. Number of moorings deployed</p> <p>2b. % of boats visiting moored sites using moorings</p> <p>2c. Number of coral areas with visible impacts relative to baseline</p>	<p>2a. Mooring equipment purchased in the 2005-2006 financial year, expected deployment of moorings will be conducted in July 2006.</p>	<p>Four permanent mooring deployed in 2006</p>
<p>3. Knowledgeable stakeholders committed to participating in coral monitoring and conservation</p>	<p>3a. Level of knowledge about coral species relative to baseline established in year 1</p> <p>3b. % of boats that return high quality monitoring data sheets</p> <p>3c. Number of persons by sector involved in monitoring activities</p> <p>3d. Number of students with advanced degrees</p>	<p>3a. Conducted the following training: Coral Reef: Identification, Ecology and Threats. One day workshop for the fishing and tourism industry Date: 30th August 2005 17 participants, including 11 scientific and NGO personnel, 1 fisherman and 5 tourist guides.</p> <p>3c. 2 fishers joined the first expedition in September 2005 for comprehensive training in underwater survey techniques.</p> <p>3d. 2 students undertaking MSc research (started September 2005)</p>	<p>Social-economic and attitudes survey of fishers and tourism industry required to provide a baseline of expectations of livelihood provision – to be conducted in 2006. This will determine how to best implement a simple monitoring protocol for marine habitat assessment.</p> <p>On-going negotiations with fishing cooperative groups, the Galapagos National Park service and the conservation communities to establish equitable benefits sharing of marine resources – establishment of quotas and zoning systems for protection of coral reef habitats (on-going).</p>

Note: Please do NOT expand rows to include activities since their completion and outcomes should be reported under the column on progress and achievements at output and purpose levels.