

## *Darwin Initiative Annual Report 2008/9*

### **Darwin Project Information**

Project Ref Number	16002
Project Title	Building capacity for sustainable fisheries management in the Wallacea region
Country(ies)	Indonesia
UK Contract Holder Institution	Operation Wallacea Trust
UK Partner Institution(s)	-----
Host country Partner Institution(s)	FORKANI
Darwin Grant Value	£150,000
Start/End dates of Project	May 2007 to March 2011
Reporting period (1 Apr 2007 to 31 Mar 2008) and annual report number (1,2,3..)	Annual Report 2
Project Leader Name	Dr Tim Coles
Project website	<a href="http://www.wallaceatrust.org">www.wallaceatrust.org</a>
Author(s), date	Dr Tim Coles, April 2009

### **1. Project Background**

One of the main problems on Indonesian coral reefs is over-fishing by local people using small scale or artisanal techniques. Until recently artisanal fishing has been regarded by the Indonesian government as too small scale to have any significant impact on reef fisheries. As a result there has been no legislation to restrict fisheries on coastal reefs and in many parts of the archipelago the reef fishery has been seriously impacted. An example of this is on the reefs around Kaledupa Island in the Wakatobi Marine National Park, SE Sulawesi in Indonesia. Scientists and university students as part of annual biodiversity and fisheries surveys funded through Operation Wallacea have studied these reefs and the fishery since 1996. The results from these surveys demonstrated a fishery that was in serious decline with average catch per unit effort at 10% of levels in other parts of the Pacific and evidence of some species being commercially extinct.

The Darwin Initiative funding was obtained to demonstrate how a reef fishery could be managed sustainably by using financial incentives. The advantage of using Kaledupa Island was the long-term presence of Operation Wallacea at the site to provide the monitoring data to assess the effectiveness of the scheme, the support (with powers devolved from central government) of the Wakatobi government in implementing the political changes needed, the existence of a strong fishers based NGO and a strong desire from the local fishers to manage their own fishery and stop the decline in their incomes.

The proposed scheme works by registering all the fishers and their boats on Kaledupa. This registration has proved popular with Kaledupan fishers since it prevents fishers from other islands utilising their reefs. Once the scheme is fully implemented though the objective is to reduce overall fishing effort to ensure the fishery begins to recover by offering businesses for up to 30% of the fishers in exchange for surrendering their licences. The fishers coming out of the fishery would therefore only do so if the businesses created more income than continuing to fish the reefs, whilst those that remain in the fishery then have a licence with a value equal to that of the income created from the businesses for those 'selling' their licences. These remaining stakeholders would be allowed to trade the licences amongst those on Kaledupa or

use them as collateral for raising funds. This scheme needs local byelaws introducing by the Wakatobi government and a Kaledupa Fishers Forum created to actively manage the reef fishery. A weekly fishery monitoring programme has been implemented to provide data by which the Forum can take the necessary decisions to maximise the sustainable yield from the reefs.

## **Project Partnerships**

### *FORKANI*

Forkani are the main partners implementing the fisheries monitoring, development of the Kaledupa Fisheries Forum, development of proposed byelaws and boat and fisher registration. Forkani have turned out to be very reliable and are doing an excellent job on the ground. The training their staff have received as part of the Darwin project has given them a much greater understanding of how to manage reefs sustainably.

### *Coral Reef Research Unit*

The CRRU at Essex University is the main partner for the biological monitoring of the reefs around Kaledupa. Their production of research papers from the programme has been outstanding.

### *Wakatobi Government*

Contacts with the Wakatobi Government either through the head of the government (Bupati) or through the Fisheries department have become more regular since implementation of the project and the Wakatobi government has already budgeted expenditure on the project of 300% more than the Darwin grant. The Bupati in particular is supportive of the project and is keen to work with the project on developing the Wakatobi as an ecotourism destination with accommodation supplied by local homestays (the most efficient of all the options available at ensuring a high percentage of any spend remains within the communities). He has already built ecotourism support facilities (jetty, field hospital) on Hoga where the project is based to encourage additional tourism and has budgeted Rp 2 billion for constructing an international marine research centre which will help with the long term monitoring of the fishery. In addition he has donated 1 ha of land, three buildings and Rp 2 billion to construct a carrageenan extraction plant. In addition the Wakatobi government has agreed a zonation plan for the reefs (Appendix 3) which will further help implementation of the project.

### *COREMAP*

From the very start of the Darwin project the head of the COREMAP project in eastern Indonesia instructed all his staff in the Wakatobi and those on Kaledupa in particular to ensure that the objectives and activities of COREMAP on Kaledupa were fully aligned with the activities of the Darwin project. COREMAP regard the Darwin Kaledupa project as an excellent prospect for establishing a flagship example of how fisheries can be managed throughout eastern Indonesia. Their remit covers the whole of eastern Indonesia and they do not have the facility to concentrate all their efforts on one island as is being undertaken by the Darwin project on Kaledupa.

## **2. Project progress**

### **2.1 Progress in carrying out project activities**

#### ***Activities postponed from previous year***

#### **December 2007 Submission of report on proposed legislation for Kaledupa fisheries to Wakatobi Government**

This activity was originally postponed because during consultation a much more effective way of achieving the same objective was discovered. As noted in the previous annual report the approach recommended by the Bupati (Head of the Wakatobi Government) and the village heads was to complete detailed village level consultation on the fishery problems and potential byelaw solutions first. That would give the team time to introduce the concept of a democratic process by which each village would have its own Forum consisting of a representative from local government (BPD) and all the fishers from that village to meet regularly to discuss ways in which the fishery on the local reefs could be managed. A representative from each of the village Forums would then be elected to a Kaledupa Fisheries Forum to work alongside the sub-district heads (Camats), and police, army and Park ranger representatives. This process was followed with all 25 villages and 2 sub villages completed by November 2008. In each village a Village Fishers Forum has been formed and a representative elected to the Kaledupa Fishers Forum.

The consultation process obtained views from each of these Village Fishers Forums on potential fishery byelaws that would have general support. Appendix 4 summarises the results of this consultation in the main villages and with partner organisations (eg The Nature Conservancy, WWF and Wakatobi National Park) and recommends introduction of the following byelaws:

1. Ensuring the reef zonation uses proposed by the Wakatobi National Park are implemented in full. This was taken further by some communities who wanted village boundaries but this would cause issues with the Bajo communities who would then be excluded from most of the reefs.
2. Ensuring that any new fish fences constructed need the prior approval of the Wakatobi Government and National Park authorities.
3. Ensuring existing fish fences have a cod end mesh of 1.5 inches (knot to knot), the leader sections closest to the cod end have a mesh of 2.5 inches and the distal end of the leader fences have a mesh of 2 inches.
4. Ensuring that all gill nets used have a mesh of 1.5 inches and a maximum length of 50m and depth of 1.3m.
5. Ensuring that all bubu traps are licenced by the Wakatobi Government and a maximum number of licences agreed for usage around the Kaledupa reefs.
6. Ensuring all middle-men selling fish to collector ships visiting the Kaledupa area are licenced by the Wakatobi Government. This came about because a number of the villages were concerned about outside fishers who mainly come for the species that can be sold to middlemen.

The effects of these proposed byelaws on the Kaledupa fishery and the impact on fishers of their introduction are currently being modelled based on the data collected on all the gear being used in Kaledupa and the weekly fisheries monitoring exercise. The analysis should be completed in June 2009 and a short report submitted on each proposed byelaw for consideration by the Kaledupa Fisheries Forum in July 2009. Whilst this activity is behind schedule the process being followed on the recommendation of the Wakatobi Government is likely to provide a much stronger basis on which to introduce local byelaws than was originally proposed. In addition legislation for a zonation plan has already been passed.

### **September 2008 Formal launch of Kaledupa Fisheries Forum**

The first meeting of the Forum was postponed from September 2008 on the recommendation of the Bupati in order to give time to complete the consultation process in each of the villages and to start on the byelaw development and fishers registration process. That gave the team time to introduce the concept of a democratic process by which each village would have its own Forum consisting of a representative from local government (BPD) and all the fishers from that village to meet regularly to discuss ways in which the fishery on the local reefs can be

managed. A representative from each of the village Forums would then be elected to a Kaledupa Fisheries Forum to work alongside the sub-district heads (Camats), and police, army and Park ranger representatives. A second meeting date of November 2008 for the Forum was also missed because the Bupati was overseas on the proposed date. Since the byelaw consultation and modeling of impacts on the fishery and fishers for each of the proposed byelaws is due to be completed in June 2009 the inaugural meeting of the Kaledupa Fisheries Forum has been scheduled for July 2009. Dr Edi Purwanto from the Operation Wallacea Trust (Indonesia) who has extensive experience of establishing and developing a similar stakeholder Forum into an effective decision making body for a World Bank/GEF funded project in the nearby Lambusango forests has been appointed to ensure the successful launch of the KFF.

Whilst this activity is behind the original proposed timetable much of the work that was going to be done after the Forum had been formed (byelaw consultation, modeling of the impacts of potential byelaws, registration of boats, census of all fishers and gear being used etc) has been done beforehand and it means that the Forum should be able to get off to a much better informed start than on the original timetable.

### ***Activities for 2008/09***

#### **April 2008 Investment in agreed business plans for alternative incomes for fishers initiated**

Construction of a carrageenan extraction plant and increasing ecotourism revenue are the two alternative income streams being developed, which will then be used to 'buy out' reef fishing licences.

#### ***Carrageenan extraction***

There are more than 300 patents Worldwide on carrageenan extraction and if a plant was going to be built on Kaledupa to give added value to the local fishers then a process needs to be developed that does not infringe any of these patents. A contract was let to Piotr Kalinowski a biochemist and patent holder on a plant nutrient extraction technique to develop the extraction technique. Due to illness he was unable to travel to the Wakatobi so dried seaweed was supplied to him in the UK and over the last 6 months he has been developing a detailed description of the extraction process and business plan. His report (see Appendix 5) describes a process that can be completed using seawater (rather than using freshwater resources which are limited on Kaledupa island) and CaO (cement, which is relatively inexpensive). The effluent is neutralised using HCl so there is a small pH neutral effluent of Calcium Chloride discharged at the end of each batch into deep water at the end of the jetty. The process described does not infringe any patents and indeed has elements, which could be patented in their own right. The approximate profits after running costs are removed are likely to be in the order of \$1 million per year – more than adequate to provide financial compensation for the

Near the end of the development process, a sample of wet seaweed was also supplied to check whether the process could also be used on seaweed that had not been dried. This would be a big advantage to the local seaweed growers since the only reason for drying the seaweed is to make transportation feasible, yet the seaweed due to be processed by the plant can be delivered within a couple of hours from any of the growing sites. The wet seaweed performed differently in the process and Piotr Kalinowski is advising that additional work is done to develop the process further so that wet seaweed can be processed.

The Wakatobi Government are fully behind this initiative and 1ha of land immediately adjacent to a deep water jetty in the village of Buranga has been donated by them for construction of the plant. This land has three existing buildings, one of which was originally designed as the departure lounge and ticket office for the Indonesian inter-island PELNI ships. In the event PELNI ships never came to Kaledupa and the buildings have been standing empty for the last 8 years. The Wakatobi Government has also budgeted Rp 2 billion for renovation of the buildings and land into a carrageenan extraction plant. The tender documents for the construction are

due to be issued before the June 2009. The selection process, which involves national advertising is likely to take around 3 months and the project has to be signed off before March 2010. The tender document has not been issued as yet because of needing the detailed description of the seaweed extraction process. A dilemma has been reached though because whilst the dried seaweed process plant could be constructed there is the possibility of improving the process yet further to accept wet seaweed, which would require a different layout of the plant. There are however, a number of the elements that are common to the wet and dried seaweed process, such as secure fencing of the 1ha area, weighing facilities for the incoming seaweed, the generator, provision of water, lab and quality testing facilities, overhead crane etc and it is proposed that only these elements are built into the tender process.

The next phase planned for implementation of the carrageenan extraction plant is for a national tender to be issued inviting private companies to bid for operation of the site. The winning company will be given a 10 year lease on the land, buildings and plant and access to the carrageenan extraction process. The winning company will be required to establish a new company for operation of the plant and will be selected on the basis of the percentage of shares in the new company that are going to be offered to registered Kaledupa fishers. In addition the winning company will be required to fund the policing of the Kaledupa fishery and the monitoring of the catches.

### *Ecotourism*

Whilst the Darwin team has been instrumental in advising on the development of ecotourism in the Kaledupa area, the Wakatobi Government has taken the lead with investment. A 1.7km runway has been opened on Wanci Island and regular weekly flights from Makassar are due to start in mid 2009. The main problem with getting ecotourists to visit the Wakatobi is their inaccessibility but these flights coupled with the three times weekly Air Asia budget airline flights from Kuala Lumpur to Makassar have substantially improved this situation. It is now going to be possible to arrive on Kaledupa Island 3 hours after leaving Makassar as opposed to the current 2 days! Lembaga Alam the Indonesian NGO consisting of Kaledupan staff, who now run the facilities on Hoga Island adjacent to Kaledupa during the Operation Wallacea survey season are preparing for running the center year round. Note Operation Wallacea has agreed a contract with Lembaga Alam, which gives them ownership of the dive and other facilities built up over the last few years.

The Darwin team has prepared promotion material for Lembaga Alam (Appendix 6) and deals have been agreed with travel agents in Makassar and Kendari. Additional promotion by Operation Wallacea in North America has also seen the numbers of visitors to Kaledupa from this organisation rise by 30% in 2009 despite the economic downturn. The increased numbers of visitors during the Operation Wallacea season plus the likely year round operation with delivery run by a 100% locally owned and operated NGO mentored by Operation Wallacea means that income received from ecotourism on Kaledupa is likely to be substantially increased in 2009.

Dr Dave Smith from the Coral Reef Research Unit (one of the Darwin partners on this project) has been appointed as the Senior Scientist advising the Wakatobi government on marine science issues. This is particularly important since the whole of the Wakatobi government area lies within a Marine National Park – the only such Kabupaten in Indonesia. The Wakatobi government is marketing ecotourism to the area based on its location in the centre of the Coral Triangle (the triangle of reefs in eastern Indonesia and southern Philippines that have the greatest diversity of hard coral genera). A key part of this strategy is having a strong research base and the Wakatobi government have budgeted Rp 2billion for the construction of a Marine Research Centre on Hoga Island to build on the existing research output of the Operation Wallacea science teams. The centre is due to be built during 2009 and will then take over the reef transect and fishery monitoring on a long-term basis.

### **September 2008 Wakatobi Government empowers Kaledupa Fisheries Forum to manage the Kaledupa reefs**

See above. Whilst verbal agreements have been made by the Bupati (Head of the Wakatobi government) to empower the Kaledupa Fishers Forum, the formal announcement of this has been delayed because of the postponement of the first meeting of the Kaledupa Fishers Forum to July 2009.

### **September 2008 Weekly fisheries landing data, coral and fish transect data and fishers interviews presented to Kaledupa Fisheries Forum for proposal and how they could develop local byelaws**

The weekly monitoring of all landings over a 24 hour period in each of the 9 main fishing villages has continued without interruption since October 2007 making this the most detailed and continuous reef fishery monitoring data set in Indonesia. The data are all stored on a Access database. Joel Rice a fisheries modeller from University of Washington has been contracted to analyse the data sets and to model the effects both on fishers and on recovery of the fishery of adopting various byelaws. This report is due to be finalised in June 2009.

Fishers communities in each of the villages across Kaledupa have been interviewed and asked for their ideas on potential fishery byelaws (Appendix 4).

The annual survey of coral and fish communities of the 108 fixed transects around Kaledupa was completed in July/August 2008 and Appendix 7 gives an analysis of the change over the last year.

### **October 2008 Workshop training for Kaledupa Fisheries Forum members on how to utilise the fisheries data being presented**

This has been delayed to July 2009 after the first meeting of the Forum and is being organised by Dr Edi Purwanto.

### **November 2008 Completion of registration of fishers and boats**

This was completed in December 2008. 100% of the motor boats used by fishers on Kaledupa have been registered. This consists of 573 boats (Appendix 8) and each have a unique code painted on them that consist of the island identification (KS), the number of their boat in each village (1 – 110) and the village code (eg TP – Tampara). This is a major achievement and no other area the size of Kaledupa in Indonesia has achieved full registration of all their fishing boats and on a voluntary basis as has been done with this project.

### **November 2008 Collaborative Park Rangers extend their enforcement activities to the registration scheme**

It was agreed with the Bupati that enforcement of the registration scheme would wait until construction of the Carrageenan extraction plant was under way and it was clear that there was going to be a financial benefit to the registered fishers.

### **December 2008 Workshop to develop collaborative enforcement strategy and enforcement of regular patrolling**

This workshop has been scheduled for August 2009 after start of the carrageenan extraction plant.

## 2.2 Progress towards Project Outputs

16 of the 18 project outputs that were scheduled to be implemented in the first two years of the project are on target or have already been completed and substantially exceeded the original target. The most impressive is undoubtedly the way the project has motivated the partners to invest in associated activities designed to achieve the same objectives as originally planned by the Darwin project. The matching funding target of £400,000 has already been doubled with funding provided by Operation Wallacea on the surveys and ecotourism development, the Wakatobi government on donation of land and buildings, and the construction contract for the carrageenan extraction plant and the construction of a marine research centre and from COREMAP on information dissemination and awareness. The production of scientific papers to underpin the project is also well ahead of schedule and is likely to substantially exceed the original target.

The two outputs that are behind schedule are both related to the postponement of the Kaledupa Fisheries Forum, which was done on the advice of the Wakatobi Government in order to ensure the consultation was completed and the data on the impacts of various proposed fisheries byelaws could be presented. Rather than producing quarterly fisheries reports and newsletters before the Forum has met these newsletters and reports would be better focussed on presenting the impacts of the various proposed byelaws so that there can be much wider dissemination of the information.

## 2.3 Standard Measures

**Table 1 Project Standard Output Measures**

Code No.	Description	Year 2 Total	Performance to date	Total planned from application
6a	Number of people to receive other forms of education/training (which does not fall into categories 1-5 above) *		Output measure completed after year 1	20 Fishery Monitors and 3 Fisheries Scientists  20 KFF members
6b	Number of training weeks to be provided		Output measure completed after year 1	2 X 1 week training courses and mentoring for 3 months
8	Number of weeks to be spent by UK project staff on project work in the host country	40 man weeks	50% of 4 year output measure achieved after year 2 On target	160 man weeks
9	Number of species/habitat management plans (or action plans) to be produced for Governments, public	2 quarterly fisheries reports produced	Behind target but species and management plans to be produced for the Forum meeting in July 2009 Forum	12 quarterly fishery management reports

	authorities, or other implementing agencies in the host country		meeting so this output can be put back on target.	
10	Number of individual field guides/manuals to be produced to assist work related to species identification, classification and recording		Output measure completed after year 1	1 Fisheries Monitoring Manual.
11a	Number of papers to be published in peer reviewed journals	7– <b>Appendices 9, 10, 11, 12, 13, 14, 15</b>	Output measure achieved after year 2 with 16 papers so far published	15 papers to be published
11b	Number of papers to be submitted to peer reviewed journals	4	A further 4 papers are in review, meaning that by the end of year 2 there have been 20 papers published or in review already	15 papers to be submitted
12a	Number of computer based databases to be <b>established</b> and handed over to the host country		Output measure completed after year 1	1 fishery database
14a	Number of conferences/seminars/ workshops to be <b>organised</b> to present/disseminate findings	0	This output measure not scheduled to be start until 2009/10'	2 workshops to be organised (fishery survey, KFF management training).
14b	Number of conferences/seminars/ workshops <b>attended</b> at which findings from Darwin project work will be presented/ disseminated	0	This output measure not scheduled to start until 2009/10	3 presentations at seminars
15a	Number of national press releases in host country(ies)	1 – article in Bakti News November 2008 – <b>Appendix 16</b>	33% of this output achieved after year 2. Measure on target because the majority of the publicity will be nearer the end of the project.	3 national Indonesia newspaper articles
15b	Number of local press releases in host country(ies)		50% of output measure target completed to end of year 2	6 local paper articles
15c	Number of national		This output	3 UK national



	press releases in UK		measure not scheduled to start until 2009/10	Press releases
16a	Number of newsletters to be produced		16% of this output measure achieved by year 2	12 X newsletters
16b	Estimated circulation of each newsletter in the host country(ies)	1000	This output measure is on target	1000 readership in Indonesia since the newsletters are circulated to all villages in Kaledupa
16c	Estimated circulation of each newsletter in the UK	25	This output measure is on target	25 readership in UK
17a	Number of dissemination networks to be <b>established</b>		Output measure exceeded after year 1	1 information network established by COREMAP
18a	Number of national TV programmes/features in host country(ies)	0	Not scheduled until 2009/10	3 Indonesian national TV programmes
18b	Number of national TV programmes/features in UK	0	Not scheduled until 2009/10	1 national UK TV programme
18c	Number of local TV programmes/features in host country(ies)		50% of output measure achieved after year 2	4 local Indonesian TV programmes
19a	Number of national radio interviews/features in host county(ies)	0	Not scheduled until 2009/10	3 Indonesian national radio programmes
19b	Number of national radio interviews/features in UK	0	Not scheduled until 2010/11	1 national UK radio programme
19c	Number of local radio interviews/features in host country(ies)		Output measure already massively exceeded	4 local Indonesian radio programmes
20	Estimated value (£'s) of physical assets to be handed over to host country(ies)	.	Output measure already achieved	£1000
21	Number of permanent educational/training/r		Output measure already achieved	1 fishery and biodiversity research

	research facilities or organisations to be established and then continued after Darwin funding has ceased			centre will continue after Darwin
22	Number of permanent field plots to be established during the project and continued after Darwin funding has ceased	108 X 50m transects established	Output measure already achieved	108 X 50m transects
23	Value of resources raised from other sources (ie. in addition to Darwin funding) for project work	£60,000 from Operation Wallacea towards survey costs in 2008 £260,000 from Wakatobi Govt on carrageenan extraction plant and marine research centre. An additional £200,000 in the value of the donated land and buildings for the carrageenan extraction plant. £125,000 from COREMAP on expenditure in Kaledupa (estimated at 25% of total expenditure from COREMAP in Wakatobi	£830,000 in matching funding achieved by the end of year 2 which is double the target for the whole 4 year period.	£402,750

**Table 2 Publications (to be inserted)**

Type * (eg journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £
Earth Science Reviews 86: 106-144	Perry, C.T.P. and Hepburn, L.J. (2008) Syn-depositional alteration of coral reef framework through bioerosion, encrustation and cementation: Taphonomic signatures of reef accretion and reef depositional events.		Appendix 9	

Environmental Science and Technology, Vol. 42, pp. 1002-1009.	Pilgrim, S.E., L.C. Cullen, D.J. Smith and J. Pretty, 2008, 'Ecological knowledge is lost in wealthier communities and countries'.		Appendix 10	
J. Phycology 44. 948-956.	Suggett DJ, Warner M, Smith DJ, Davey P, Hennige S, Baker NR. 2008. Photosynthesis and production of hydrogen peroxide by symbiotic dinoflagellates during short-term heat stress.		Appendix 11	
The Open Marine Biology Journal. Volume 3.	Unsworth, R.K. Salinas De Leon, Garrard, S. L., Smith, D. J. Bell, J. (2009). Habitat Usage of the Thumbprint Emperor Lethrinus harak (Forsskal, 1775) in an Indo-Pacific Coastal Seascape.		Appendix 12	
Aquatic Biology. 5: 85-95.	Richard K. F. Unsworth,, Samantha L. Garrard, Pelayo Salinas De León, Leanne C. Cullen, David J. Smith, Katherine A. Sloman, James J. Bell. (2009). Structuring of Indo-Pacific fish assemblages along the mangrove-seagrass continuum.		Appendix 13	
Marine Biology. 156: 1021-1027.	Jessica Haapkylä , Adrian S. Seymour, Orit Barneah, Itzchak Brickner, Sebastian Hennige, David Suggett and David Smith (2009). Association of Waminoa sp. (Acoela) with corals in the Wakatobi Marine Park, South-East Sulawesi, Indonesia..		Appendix 14	
Biological Biodiversity. 1 - 12	Smith, D. J., Sugget, D., J. Etienne, M., Pretty, J. (2009). Climate change and coral reef system.		Appendix 15	
Marine Ecology Progress Series. In press	Hennige SJ, Smith DJ, Perkins R, Consalvey M, Patterson DM, Suggett DJ. Photoacclimation, growth and distribution of massive corals in clear and turbid waters.			
Marine Biology (In review)	Leanne J. Hepburn <sup>1</sup> , David J. Smith <sup>1</sup> and James J. Bell (In review).			

	Implications of low erosion rates by bioeroding sponges on the carbonate balance of a sedimented Indonesian coral reef..			
To be re-submitted	Fish Fences as a Model of Extreme Overexploitation of Coral Reef Subsistence Fisheries Exton, D.A., Cullen, L., Pretty, J., May, D., Tibbott, C., Smith, D.J. (2008)			
Animal Conservation (In Press)	Unsworth RKF, Cullen LC, Bell JJ, Smith DJ, Pretty J (2009) Economic and subsistence values of the standing stocks of seagrass fisheries: benefits of no-fishing marine protected area management			

## 2.4 Progress towards the project purpose and outcomes

The purpose of the project is to build capacity for sustainable fisheries co-management in the Wakatobi Marine National Park. The assumptions that national & regional government act on policies that support community based co-management, that the political climate remains stable and that fishers remain receptive to programme have all held true. The continuing fisheries monitoring programme run entirely by Kaledupan staff, the completion of the registration of 100% of the motorised fishing boats used for fishing, the development of the carrageenan extraction process and the funding for the construction of the plant by the Wakatobi government together with their support for ecotourism development indicates that the project has a strong chance of success.

The indicators originally proposed will reflect the success or failure of the project. However the timing of the functioning of the Kaledupa Fisheries Forum needs to be moved back to year 3 given the change in approach to developing support for this concept that was outlined above.

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

The first two years of the project have been designed to monitor the fishery and to develop the byelaws, boat registration and the business opportunities to fund the buy-outs to reduce fishing pressure. It would therefore have been surprising had there been any progress on this aspect as yet.

## 3. Monitoring, evaluation and lessons

Four outputs were proposed in the original proposal

### 1. Fisheries co-management established and functioning under the KFF

This output had two suggested measurable indicators; that KFF members are trained in fisheries management by year 2 and that island wide fisheries regulations are introduced by year 2. Note both of these indicators were delayed on the advice of the Wakatobi Government

to complete consultation on potential byelaws and then model their impact on the fishery. The indicators will be completed in year 3.

## *2. Effective enforcement of fisheries regulations*

This output had two suggested measurable indicators that the KFF develop and maintain effective surveillance and collaborative policing strategy by year 2 and that there are reduced levels of non-compliance by year 3. Note the year 2 indicator has been delayed until the carrageenan business is closer to fruition and enforcement can begin in earnest.

## *3. Fisheries & biodiversity assessment program established & functioning*

This output had four suggested measurable indicators; that the Senior Fisheries Manager, 3 Fisheries Scientists and 20 Fishery Monitors are trained in fisheries monitoring programme, that weekly fish landings surveys are completed and interview data from fishers registration recorded, that the CRRU completes fish and biodiversity monitoring on 108 transects and that data condensed into reports and proposed management actions for KFF to use for decision making. The means of verification for these indicators were training workshop attendance, provision of database, CRRU reports and Quarterly reports to KFF. All of these outputs have been achieved except for the quarterly KFF reports. There is a schedule of publications for year 3 once the KFF first meets that means these reports will be caught up.

## *4. Alternative income sources developed to provide 'buy out's of fishing licences and reduce fishing effort*

This output had four suggested measurable indicators; development of business plans to provide income for 30% (in fishing effort terms) of fishers to sell their licences, exchange of licences for businesses and generation of sufficient business income to complete the buy outs. The means of verification for these indicators were: business plans, data on numbers of fishing licences bought out and budgets from year 3. This output is well on target.

## **4. Actions taken in response to previous reviews**

***The fish catch monitoring procedure appears relatively complex. Is the Project Leader confident it can be monitored effectively in the long term? Are the transaction costs bearable for local fishers and what do the benefit from it? By what mechanism and how confident is the PL that this activity will be financed in the long run from the sustainable business opportunities, and if this proves not to be effective are there alternative plans?***

The fish monitoring programme has now been running continuously for 17 months on a weekly basis and over the last year has been run entirely by Kaledupan staff. Funding the fisheries monitoring programme is a requirement of the company selected to run the carrageenan extraction plant and to benefit from the process development funding from the Darwin Initiative and the plant investment by the Wakatobi government.

***The project is carrying out significant institution building (KFF & Lembaga Alam), does the PL consider the project has sufficient access to expertise in these components?***

This was a weakness in the original staffing of the project and has now been solved by appointing Dr Edi Purwanto who has experience of establishing a running the Lambusango Forest Forum as part of a World Bank /GEF funded project on the nearby island of Buton. The Lambusango Forum had many of the same objectives as the proposed Kaledupa Fisheries Forum. Operation Wallacea who have operated the base on Hoga are continuing to mentor Lembaga Alam and have placed a staff member on their Board.

***The project is implementing a common property resource regime, where fishers (from other islands) will be excluded from the island's fishing grounds. Will each village***

***fisher's forum also be responsible for fishing grounds with identified boundaries?***

Although some of the Kaledupan villages have traditional fishing grounds this is not true of the Bajo community. Allocating reefs to be controlled by individual fishers would have been the preferred management option since it has a track record of success, but sadly was not possible in this situation. Hence the need for a common property resource approach to the Kaledupan reefs with fishing effort limited by licences.

***The project funded research into the loss of local ecological knowledge (LEK). How are the results of this research being fed into the operation of the fisheries forum? The Darwin Initiative financial contribution to this research was not acknowledged in the publication. Was this for any particular reason?***

Forkani carried out much of the investigation of the loss of ecological knowledge and this is the organisation that is working with the fishers Forum.

***How are the numerically smaller, marginalised, and less empowered Bajo fishing community, but who make up 50% of the total number of fishers going to be fairly treated in regard to the 30% reduction in fishers? Will they be in position to take up alternatives, what long-term impact will this have on their fishing culture?***

The access by the Bajo to seaweed farming and ecotourism revenue is less than for the Kaledupan community since few of them have access to areas of reef where they can grow seaweed. Nor do they have the capital to invest in building houses for ecotourism. Bajo culture and sense of identity is closely linked to fishing. If the reef fishery continues to decline then the impact on the Bajo culture will be enormous. Developing a scheme that allows the fishery to recover will have a positive impact on the Bajo community since those fishers remaining in the fishery will have access to greater catches even though they won't benefit from the buy outs.

***In some communities seaweed farming is essentially a supplementary livelihood activity. Is there sufficient understanding of the household dynamics that would encourage a fisherman to switch from fishing to seaweed farming?***

A large number of fishers are already growing seaweed as a supplementary income. However, whilst seaweed growers will benefit from construction of the carrageenan extraction plant because of farm gate prices instead of the current prices offered by middlemen, the concept of offering shares to Kaledupa reef fishery licence holders though does not depend on them being sea weed farmers. The buyouts will tend to target fish fence and gillnet operators first since this will have the biggest impact on reducing overall fishing effort.

***Standard measure 21 reports the establishment of a fishery and biodiversity research centre on Kaledupa. This measure does not seem well reported in the main text and does not seem to be reflected in the budget please provide more details on the nature, operation and funding of the research centre? Which other institutions are providing co-financing?***

The Wakatobi government is funding the development of the fishery and biodiversity research centre.

***Can the PL clarify the links between Operation Wallacea Trust, Operation Wallacea Ltd, and the Wallacea Institute? To what extent does the Trust depend on the activities of the expedition company and should the latter two organisations be listed as project partners?***

Operation Wallacea is a company that runs the research expedition programme on Hoga each year. The Operation Wallacea Trust is an independent organisation (no shared Directors) from Operation Wallacea although Operation Wallacea staff provide admin support for the Trust. Operation Wallacea could be listed as a project partner if required.

## **5. Other comments on progress not covered elsewhere**

None

## 6. Sustainability

The main approach for ensuring the project continues long after the Darwin funding finishes is to ensure that the alternative income streams (carrageenan extraction, ecotourism) being developed produce enough income for the necessary buy outs to continue. The Operation Wallacea Trust and Operation Wallacea are committed to continue working in the area after the Darwin project finishes and Operation Wallacea has a sustainable business model independent of grant aid.

## 7. Dissemination

Much of the dissemination activity is scheduled for years 3 and 4 of the project. Dr Edi Purwanto who was outstanding in disseminating information about the Lambusnago World Bank/GEF project has now been appointed to the Kaledupa project and will be ensuring wide dissemination of the lessons learned.

## 8. Project expenditure during the reporting period (Defra Financial Year 01 April to 31 March)

Item	Budget	Expenditure	Balance
Rent, rates, heating, overheads etc	2,500.00	2,500.00	0.00
Office costs (eg postage, telephone, stationery)	2,000.00	2,000.00	0.00
Travel and subsistence	6,414.00	6,414.00	0.00
Printing	1,100.00	1,100.00	0.00
Conferences, seminars, etc	2,661.00	2,661.00	0.00
Capital items/equipment	0	0	0.00
Others	500.00	500.00	0
Salaries (specify)	34,825.00	34,825.00	0.00
<b>TOTAL</b>	<b>50,000.00</b>	<b>50,000.00</b>	<b>0.00</b>

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

There are 4 main achievements of the project to date;

1. Developing and continuously running a weekly fisheries monitoring programme for 17 months on the 9 main villages across Kaledupa. Note COREMAP a \$200 million World Bank funded project has not achieved this level of monitoring. The achievement s all the more considerable since the monitoring programme is entirely run by local Kaledupan staff. The data are now there for the effects of various potential byelaws to

be modelled so that the decisions on which are the most effective regulations can be made.

2. Compiling database records of 1000+ fishers across the island and their fishing gear. In addition all motorised boats used for fishing have been registered and individual identification codes painted on each of the boats (more than 550 boats). There is no other area of Indonesia where such a detailed census of fishers has been completed and 100% of reef fishing boats registered.
3. Development of a potential income streams that have the financial power to buy out sufficient fishers' licences to reduce fishing effort to a point where the fishery can start recovering. The development of a carrageenan extraction process using sea water and CaO and which does not infringe any existing [patents is an outstanding achievement. In addition the financial commitment of the Wakatobi government in agreeing to donate the building and land at Buranga and to budget Rp2 billion to construct the plant means that the investment needed to get this income stream developed is in position. Moreover the commitment by the Wakatobi government in building a airport on Wanci and marine research centre and the year round operation of the Hoga centre by local organisation Lembaga Alam means ecotourism income is likely to rise.
4. The number of publications in peer reviewed journals has already exceeded the target of 15, with 16 papers published to data and a further 4 in review. Note one of those in for review was refused and has to be re-submitted to another journal because a copy of the draft paper was on the Operation Wallacea/ Darwin web site as an Appendix and was therefore regarded as published. Only copies of those papers already published have therefore been included in this Annual Report.



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

Project summary	Measurable Indicators	Progress and Achievements April 2008 - March 2009	Actions required/planned for next period
<p><b>Goal:</b> <i>To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve</i></p> <p><i>The conservation of biological diversity,</i></p> <p><i>The sustainable use of its components, and</i></p> <p><i>The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources</i></p>		<p><i>(report on any contribution towards positive impact on biodiversity or positive changes in the conditions of human communities associated with biodiversity eg steps towards sustainable use or equitable sharing of costs or benefits)</i></p>	<p><i>(do not fill not applicable)</i></p>
<p><i>Purpose</i> To build capacity for sustainable fisheries co-management in the Wakatobi Marine National Park</p>	<p>KFF functioning effectively by yr1</p> <p>Fisheries monitoring and assessment functioning by yr1</p> <p>Effective enforcement system by yr3</p> <p>Initiation of 'buy outs' by year 2</p> <p>Evidence of recovery of fisheries by yr4</p>	<p>Progress on this has been delayed until March 2009 on the advice of the Bupati</p> <p>Functioning and been running continuously since October 2007</p> <p>Delayed until the carrageenan extraction plant is developed</p> <p>Investment in the income generation techniques needed for the buy outs ahs been achieved</p>	<p>Forum scheduled for July 2009 and to receive information on the impacts of potential fishery byelaws that could be introduced</p> <p>Enforcement due to start when carrageenan plant construction starts</p> <p>Appointment of the selected carrageenan extraction company with shares being offered to licence holders</p>
<p>1. Fisheries co-management established and functioning under the KFF</p>	<p>KFF members trained in fisheries management by yr2</p> <p>Island wide fisheries regulations by yr2</p>	<p>Byelaws delayed to complete consultation and modelling of impact of fishery byelaws.</p>	

2. Effective enforcement of fisheries regulations	KFF develop and maintain effective surveillance and collaborative policing strategy by yr2  Reduced levels of non-compliance by yr3	
3. Fisheries & biodiversity assessment program established & functioning	Senior Fisheries Manager, 3 Fisheries Scientists and 20 Fishery Monitors trained in fisheries monitoring programme.  Weekly fish landings surveys completed and interview data from fishers registration recorded  CRRU completes fish and biodiversity monitoring on 108 transects  Data condensed into reports and proposed management actions for KFF to use for decision making	Completed in year 1  Completed  Completed  Scheduled for June 2009
4. Alternative income sources developed to provide 'buy out's of fishing licences and reduce fishing effort	Development of business plans to provide income for 30% (in fishing effort terms) of fishers to sell their licences  Exchange of licences for businesses	Carrageenan extraction process developed and funding obtained to build the plant

## Annex 2 Project's full current logframe

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p><b>Goal:</b></p> <p>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"> <li>• the conservation of biological diversity,</li> <li>• the sustainable use of its components, and</li> <li>• the fair and equitable sharing of benefits arising out of the utilisation of genetic resources</li> </ul>			
<p><b>Purpose:</b></p> <p>To build capacity for sustainable fisheries co-management in the Wakatobi Marine National Park</p>	<p>KFF functioning effectively by yr1</p> <p>Fisheries monitoring and assessment functioning by yr1</p> <p>Effective enforcement system by yr3</p> <p>Initiation of 'buy outs' by year 2</p> <p>Evidence of recovery of fisheries by yr4</p>	<p>KFF quarterly meeting reports</p> <p>Field survey reports and database</p> <p>Ranger and local community enforcement records</p> <p>Budgets</p> <p>Project technical reports</p>	<p>National &amp; regional government act on policies that support community based co-management</p> <p>Political climate remains stable</p> <p>Fishers remain receptive to programme</p>
<p><b>Outputs:</b></p> <p>1. Fisheries co-management established and functioning under the KFF</p>	<p>KFF members trained in fisheries management by yr2</p> <p>Island wide fisheries regulations by yr2</p>	<p>KFF training workshop attendance</p> <p>Village and KFF meeting records</p>	<p>KFF members remain committed to program</p> <p>KFF legislation and zonation accepted by National Park and regional government</p>
<p>2. Effective enforcement of fisheries regulations</p>	<p>KFF develop and maintain effective surveillance and collaborative policing strategy by yr2</p>	<p>Community and Ranger training (funded by COREMAP) workshop attendance levels</p>	<p>Local Rangers co-operate with KFF policing strategy</p> <p>Communities are proactive in self-policing</p>

	Reduced levels of non-compliance by yr3	Park Ranger & community records	High legitimacy of regulations
3. Fisheries & biodiversity assessment program established & functioning	<p>Senior Fisheries Manager, 3 Fisheries Scientists and 20 Fishery Monitors trained in fisheries monitoring programme.</p> <p>Weekly fish landings surveys completed and interview data from fishers registration recorded</p> <p>CRRU completes fish and biodiversity monitoring on 108 transects</p> <p>Data condensed into reports and proposed management actions for KFF to use for decision making</p>	<p>Training workshop attendance</p> <p>Database</p> <p>CRRU reports</p> <p>Quarterly reports to KFF</p>	Trained project staff continue to operate under KFF and use skills provided
4. Alternative income sources developed to provide 'buy out's of fishing licences and reduce fishing effort	<p>Development of business plans to provide income for 30% (in fishing effort terms) of fishers to sell their licences</p> <p>Exchange of licences for businesses</p> <p>Generation of sufficient business income to</p>	<p>Business plans</p> <p>Data on numbers of fishing licences bought out</p> <p>Budgets from year 3</p>	Businesses develop sufficient income

Activities	Activity milestones (summary of project implementation timetable)	Assumptions
Co-management Framework	Yr 1 Establish fisheries monitoring programme; Yr 2 Ensure KFF functions as a decision making body and registration process completed Yr 3 Ensure KFF has partial funding from business income Yr 4 Ensure KFF is self-sufficient from business income	District government and National Park support legislation and zonation to establish KFF Business income from ecotourism and marine aquarist supplies is sufficient
Training & Capacity Building	Yr 1 Training for project team on monitoring and assessment techniques, database analysis and reporting to KFF; Yr 2 Sustainable fisheries management workshop for KFF members; Yr 2 Workshop to develop collaborative enforcement strategies (police, park rangers and communities)	Local partners remain committed to project and are effective in transferring knowledge and skills
Field Research Program	Yr 1 Development of biological and socio-economic program; Economic study for alternative incomes Yr 2 Establish scientific basis for a sustainable fishery using field data;; Yr 3 Analysis of biological and socio-economic time series data	Local communities remain willing to comply with fisheries and socio-economic monitoring
Dissemination & Publicity	Quarterly KFF info bulletin & annual report Yr 2 Manual produced on fisheries assessment and management Yr 2 - 4: radio and TV broadcasts, and national and local newspaper articles Yr 3 Film produced to increase public awareness of the importance of sustainable resource use; Scientific publications.	Local and national press remain interested in project progress

Appendix 3 Zonation Plan for the Wakatobi Marine National Park

Appendix 4 Results of the consultation process over potential fishery byelaws

Appendix 5 Description of the carrageenan extraction process

Appendix 6 Promotional material for Lembaga Alam

Appendix 7 Changes in the coral and fish communities around Kaledupa Island

Appendix 8 List of the registered fishing boats on Kaledupa Island

Appendix 9 Perry, C.T.P. and Hepburn, L.J. (2008) Syn-depositional alteration of coral reef framework through bioerosion, encrustation and cementation: Taphonomic signatures of reef accretion and reef depositional events. *Earth Science Reviews* 86: 106-144

Appendix 10 Pilgrim, S.E., L.C. Cullen, D.J. Smith and J. Pretty, 2008, 'Ecological knowledge is lost in wealthier communities and countries'. *Environmental Science and Technology*, Vol. 42, pp. 1002-1009

Appendix 11 Suggett DJ, Warner M, Smith DJ, Davey P, Hennige S, Baker NR. 2008. Photosynthesis and production of hydrogen peroxide by symbiotic dinoflagellates during short-term heat stress. *J. Phycology* 44. 948-956.

Appendix 12 Unsworth, R.K. Salinas De Leon, Garrard, S. L., Smith, D. J. Bell, J. (2009). Habitat Usage of the Thumbprint Emperor *Lethrinus harak* (Forsskal, 1775) in an Indo-Pacific Coastal Seascape. *The Open Marine Biology Journal*. Volume 3.

Appendix 13 Richard K. F. Unsworth,, Samantha L. Garrard, Pelayo Salinas De León, Leanne C. Cullen, David J. Smith, Katherine A. Sloman, James J. Bell. (2009). Structuring of Indo-Pacific fish assemblages along the mangrove-seagrass continuum. *Aquatic Biology*. 5: 85-95.

Appendix 14 Jessica Haapkylä , Adrian S. Seymour, Orit Barneah, Itzchak Brickner, Sebastian Hennige, David Suggett and David Smith (2009). Association of *Waminoa* sp. (Acoela) with corals in the Wakatobi Marine Park, South-East Sulawesi, Indonesia. *Marine Biology*. 156: 1021-1027

Appendix 15 Smith, D. J., Sugget, D., J. Etienne, M., Pretty, J. (2009). Climate change and coral reef system. *Biological Biodiversity*. 1 - 12

Appendix 16 Article in Bakti