

Darwin Initiative Annual Report [Template with Guidance]

Important note:

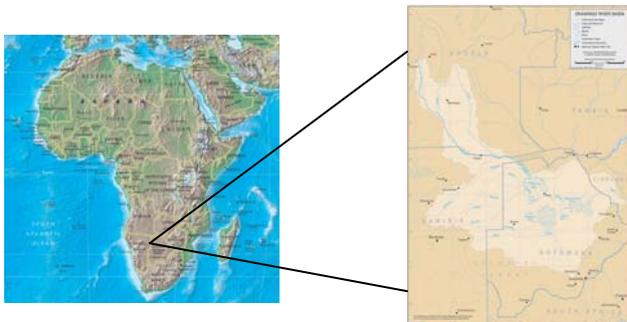
To be completed with reference to the Reporting Guidance Notes for Project Leaders – it is expected that this report will be about 10 pages in length – Submission deadline 30 April 2007

Darwin Project Information

Project Ref Number	162/14/029
Project Title	Monitoring and simulating threats to aquatic biodiversity in the Okavango Delta
Country(ies)	Botswana
UK Contract Holder Institution	UCL
UK Partner Institution(s)	
Host country Partner Institution(s)	Harry Oppenheimer Okavango Research Centre (HOORC)
Darwin Grant Value	£188,441
Start/End dates of Project	01-Jan-06 to 31-Dec-08
Reporting period (1 Apr 200x to 31 Mar 200y) and annual report number (1,2,3..)	1 Apr 2006 to 31 Mar 2007 Annual report 2
Project Leader Name	M. Todd & AW Mackay
Project website	www.geog.ucl.ac.uk/~mtodd/accord
Author(s), date	Mackay, A.W., Mazebedi, R., Todd, M. & Wolski, P. April 2007

1. Project Background

The Okavango Delta (OD) in northwest Botswana is the world's second largest inland wetland region. The delta is maintained by annual pulse flooding of the Okavango River (whose catchment lies largely in the highlands of central Angola) creating unique wetland habitats with exceptionally high beta diversity. The annual flooding in the delta is out of phase with the local wet season so that uniquely it provides a water resource in the dry season. It is one of the WWF's top 200 eco-regions of global significance and the world's largest Ramsar site. The Okavango river system is considered by many to be the last near pristine river in Africa. However, the system is under threat from potential development initiatives in the basin and from climate change. This project (led by Todd and Mackay at UCL) aims to build capacity in key institutions involved in conservation of biodiversity in the OD, to assist in implementation of the Convention on Biological Diversity (CBD). This will involve an integrated, multi-disciplinary programme of (a) scientific research to develop baseline aquatic biodiversity characterisations (phytoplankton, macroinvertebrate and macrophyte assemblages) and their relationship with hydrological drivers, namely the hydroperiod (flood duration and frequency), and water quality; (b) training in methods of aquatic biological data collection, analysis and system modelling. This will enable for simulation of aquatic biological diversity responses to scenarios of future changes to basin climate and hydrology, which will be crucial to informing policy decisions for biodiversity protection/conservation within the Okavango Delta Management Plan.



2. Project Partnerships

In addition to the formal activities of the project described about the project partners are in email contact on an almost daily basis to ensure problems can be identified and addressed quickly. In addition, UCL and HOORC staff involved in the Darwin project have several publications, stemming from ongoing collaboration on the WERRD project – these have direct relevance for the Darwin programme, and are highlighted in Table 2.

Mackay has also established contact with Dr Hillary Masundire, Department of Biological Sciences, University of Botswana. He has agreed to act as a formal supervisor for Mr Richard Mazebedi, the Darwin MPhil research student. This is significant because Dr Masundire holds the post of Chairman of the IUCN Commission on Ecosystem Management, and is currently sits on the Conservation Committee of SIL (International Association of Theoretical and Applied Limnology).

The partnership between UCL and HOORC is still on course to significantly influence the host institution's capacity to meet CBD commitments. On 14th September 2006, Mackay attended the official launch of a major new project: Building Local Capacity for the Conservation and Sustainable use in Biodiversity in the Okavango Delta (BIOKAVANGO Project) in Maun, Botswana. This multi-million-dollar programme is funded by the UN Global Environment Facility (GEF), with co-financing by the Government of Botswana, IUCN, plus several other smaller organisations. The Darwin programme will assist in BIOKAVANGO in reaching its main objective (to support the elaboration and implementation of the Okavango Delta Management Plan) by strengthening the institutional environment through training and basic research into biodiversity practises and conservation goals on the Delta. Mackay has

been in regular contact with the National Project Co-ordinator Dr Nkobi Moleele on how best the Darwin programme can assist the BIODIVERSITY project through the data collected here.

Linked to this, Mackay's link with Dr Will Darwill, at IUCN, Cambridge, is progressing well, and we hope to participate in some joint research and training at HOORC over the next year (although this is dependent on IUCN making their final decision to commit funds to HOORC April 2007).

3. Project progress

This project report is structured around the key milestones originally highlighted in the project timetable.

3.1 Progress in carrying out project activities

Initial planning workshop to be held at HOORC (Apr 2006)

The planning workshop was held at HOORC at which researchers, local government officials and stakeholders within the Delta were invited. We presented talks on aims of the project and the need to monitor and evaluate aquatic biodiversity (Mackay), biodiversity in the Okavango Delta (Murry-Hudson) modelling hydro-period (Wolski), current work on bioassessment in the Delta (Mosepele) and on the Darwin programme in general (Mackay). These are available as PDF handouts on the project website.

Botswana press launch of programme

Local news papers were informed of the start of the workshop

1 UB Masters by Research studentship appointed

Richard Mazebedi has been appointed as an MPhil student on the project, and will be co-supervised by Mackay (UCL), Dr Musundire (UB), Mrs Mosepele (HOORC)

Taxonomy training course to be held at HOORC to train staff and Masters students

Taxonomic training has been on-going at HOORC with respect to macroinvertebrates and macrophytes over the last year. Training in diatoms will follow.

Identification of up to 100 candidate sites

This is an ongoing processes, as new sites are added to our training set during each fieldwork season. In September 2006, 32 sites were sampled and geo-referenced. In December, another 67 sites were visited and geo-referenced, including over 40 new sites. New sites will be identified and geo-referenced in future trips planned for April, July and September 2007.

Production of training manuals and protocols

Sampling protocols have been developed, and these are available on our website. Taxonomic keys will be produced at the end of the programme.

Field methods training course held at HOORC

Two field-based training courses were held at HOORC. The first was held in September 2006, and involved UCL and HOORC staff. The second training course was held in January 2007, and involved HOORC staff and students, and also Governmental personnel and representatives from the Safari tourist camps.

Sampling programme initiated: Fieldtrip 1 (UCL,HOORC,IC staff), followed by taxonomic identification and counting

- This took place in September 2006

Sampling programme initiated: Fieldtrip 2 (HOORC, IC staff), followed by taxonomic identification and counting

- This took place in December 2006

Sampling programme initiated: Fieldtrip 3 (HOORC, IC staff), followed by taxonomic identification and counting

- This has been delayed from February 2007, and will instead take place in April 2007. The reasons for this delay is because overall fieldwork sampling started a month later than originally estimated 2 years ago, and so in order to get true seasonal representation, the next appropriate fieldtrip has been but back 2 months to April 2007 (actual dates: 22/4/07 – 7/05/07).

3.2 Progress towards Project Outputs

We think that we have made excellent progress with regard to project outputs. We have provided more training to local HOORC personnel than originally anticipated, and full training details were already given in the 6 month report (so are not repeated here).

3.3 Standard Output Measures

Table 1 Project Standard Output Measures

Code No.	Description	Year 2 Total
Established codes		
4A/B	7 UB undergraduates attended the HOORC winter school during 2006-2007	7
4C	Richard Mazebedi (Botswanan) MPhil	1 person, 2 weeks total
4D	2 weeks	
5	As highlighted in this years interim report, this has changed from the original detail given in the proposal, in that 5 technicians linked to our Darwin programme are receiving training in lab and field techniques. The staff are: Mr Rebaeone Moshongo (33 yrs); Kelejewang Kutoro (31 yrs); Florah Joshua (25 yrs); Uanee Kauheva (24 yrs) and Laone Pitso (26 yrs). One MPhil student is working on the progamme (Mr Richard Mazebedi), and as highlighted last year, CI no longer operate in Botswana. We have yet to secure the placement of a second UB Masters student.	5 technicians (including MPhil researcher)
6A/6B	We can confirm from last year's report that at the start of this reporting period, 2 scientists from HOORC attended	2 people, 3 weeks total

	intensive advanced-level training courses held in the UK in Macrophytes (30 th April - 6 th May 2006) (Ms Belda Mosepele, the Darwin Research Fellow) and in Diatoms (5 th - 9 th June 2006) (Ms Philippa Mapila, associated research fellow on the project).	
6A/6B	The following HOORC staff have all had ecological and monitoring training as part of the Darwin programme during fieldtrips in Sep 06 and Dec 06. Research staff: Philippa Huntsman-Mapila; Field assistants: Wilfred; Thebe.	4
6A/6B	Furthermore, a 1-week training course was held at HOORC on the Okavango Delta on water quality monitoring, biological sampling, metals and organics contamination analysis, data analysis and a discussion on suitable monitoring programmes (Jan 22 nd –26 th Jan 07). 15 people participated on the course (8 from HOORC; 6 from Government - Department of Water Affairs, North-West District Council, Water Unit staff; 1 Safari Camps)	15
6A/6B	UCL training in multivariate statistics. We decided that no-one from HOORC would attend the UCL intensive course on multivariate statistics. Instead we propose to hold a short course in multivariate statistics at HOORC later this year, which will be run by Mackay. The rationale for this lies in that by holding a course tailored to the needs to the research centre, we can train several people at once. From visits to HOORC, we know that several people are interested in such training.	
7	As we collect biological data and archive the samples digital images are continually taken. These will form the bases for identification manuals by the end of the project. However, several collection and analysis protocols are already available on-line	
8	April - 1 week, 2 staff members Sept - 3 weeks, 2 staff members Dec - 2 weeks, 2 staff members The third fieldtrip will now take place in April 2007, rather than the originally planned Feb 2007. Hence 6 weeks spent in host country rather than 9. However, in terms of person weeks spent in Botswana, this amounts to 12 weeks given that 2 UCL staff visited Maun each trip.	12
10	On-going – see Code number 7 above	
13A	Archive slides from the first two fieldtrips have been prepared at UCL and will be transported to HOORC in April 07. Relevant diatom flora have been purchased	
13B	This work is on-going as sites are visited each fieldtrip.	
14A	A workshop was held at HOORC at which researchers, local government officials and stakeholders within the Delta were invited (Water Affairs Department, ODMP, Safari Tour	1

	operator). We presented talks on aims of the project and the need to monitor and evaluate aquatic biodiversity (Mackay), biodiversity in the Okavango Delta (Murry-Hudson) modelling hydroperiod (Wolski), current work on bioassessment in the Delta (Mosopele) and on the Darwin programme in general (Mackay).	
17A	At the moment we have established several small mailing groups, e.g. Laboratory, Management, Training.	
15A & B; 18A; 19A	National press release at official start of programme; local media were informed. Mackay & Wolski were also interviewed by the Chief Editor of the Botswanan Wena Industry and Environment Magazine, and we are currently putting together an article on the Darwin programme for publication in a future issue No national TV or radio programmes featured our research.	
New - Project specific measures		

Table 2 Publications

<i>Detail (title, author, year)</i>
<i>Available from: see doi at end of each paper</i>
Wilk, J., Kniveton, D., Andersson, L., Layberry, R., Todd, M.C. , Hughes, D., Ringrose, S. & Vanderpoost, C. 2006. Estimated rainfall, water balance over the Okavango River Basin for hydrological applications. <i>Journal of Hydrology</i> 331, 18-29. doi:10.1016/j.jhydrol.2006.04.049
Andersson, L., Wilk, J., Todd, M.C. , Hughes, D., Earle, A., Kniveton, D., Layberry, R., & Savenije, H.H.G. (2006) Scenarios of the impact of changes of climate and water use on water flow in the Okavango River. <i>Journal of Hydrology</i> 331, 43-57 doi:10.1016/j.jhydrol.2006.04.039
Wolski, P. , Savenije, H.H.G., Murray-Hudson, M. & Gumbricht, T. 2006. Modelling of the flooding in the Okavango River, Botswana, using hybrid reservoir-GIS model. <i>Journal of Hydrology</i> 331, 58-72. doi:10.1016/j.jhydrol.2006.04.040
Murray-hudson, M. , Wolski, P. & Ringrose, S. 2006. Scenarios of the impact of local and upstream changes in climate and water use on hydr-ecology in the Okavango Delta, Botswana. <i>Journal of Hydrology</i> 331, 73-84 doi:10.1016/j.jhydrol.2006.04.041

3.4 Progress towards the project purpose and outcomes

Excellent progress has been made towards the project purpose of (i) undertaking scientific research to develop baseline aquatic data on phytoplankton, macroinvertebrates and macrophyte assemblages. Their relationships to hydrological drivers and water quality have still to be tested, although this will come once more data are collected; (ii) training in methods of aquatic biological collection, analysis and system modelling. Hydrological modelling and potential impacts on the Okavango ecosystem are progressing very well (see papers listed in Table 2 above), while progress in high resolution estimates of future climate using regional climate models is also progressing well, with the UCL MPhil student

(Srivatsan Vijayaraghavan) associated with the Darwin programme being upgraded to PhD status earlier this year.

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

To date there has been little impact of project on biodiversity as yet, given that a large part of the data collection and analysis has still to be done. However, our training has been significant, and we would hope that this will result in a legacy for future biodiversity research.

4. Monitoring, evaluation and lessons

Monitoring of our project has taken several forms. With respect to data analysis and collection, evaluation can best be measured by the number of sites visited and biological and water chemistry samples analysed. Mackay has already received completed macroinvertebrate data from HOORC for the fieldtrips in September and December 2006. Diatom samples for these trips have already been prepared, and will be counted later this summer. Chemistry of the water samples has largely been undertaken, for the first two trips and data have been recently exchanged between HOORC and UCL.

Training can best be evaluated by the number of personnel trained in techniques used in this project. Moreover, the MPhil student, Richard Mazebedi successfully defended his Darwin proposal to a committee of scientists and researchers in March 2007. His completed research proposal and a PDF handout of his talk can be found on our website.

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

There were no issues raised from the previous reports.

6 Other comments on progress not covered elsewhere

Training of personnel has been enhanced since the original proposal.

We have found it very difficult however to find a second suitably qualified student to take up the other MPhil position. This is partly because although funds are available from our project to cover their fees, there are no funds to cover a stipend. We do **not** think that we will be able to find a 2nd student, and have already contacted the Darwin Administration about this in a previous email. This has currently not been resolved. To try and overcome this difficulty (in terms of finding good research quality students to train and undertake some of the work promised on the programme) I was able to secure the interest of two MSc Conservation students taking degrees at UCL, to undertake projects linked to our Darwin programme. However, from correspondence to date with Darwin, the Secretariat does not seem able for us to use a very small amount of monies to help support their work on the Delta, and I have therefore had to find contributions to their field costs elsewhere.

7 Sustainability

We have made very good links with a major new GEF-funded programme, BIODIVERSITY (see above). Our Darwin programme was used in the original proposal as providing the underlying basic aquatic biodiversity research. We will continue to feed into this GEF programme throughout the life of this project. Furthermore, an Open Day for journalists was held at HOORC to showcase all of their ongoing projects, and the Darwin was promoted there (see attached flier in the attachment).

8 Dissemination

Mackay was also interviewed by the Chief Editor of the Botswana *Wena Industry and Environment Magazine*, and we are currently putting together an article on the Darwin programme for publication in a future issue.

9 Project Expenditure

Please expand and complete Table 3.

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

Highlight any agreed changes to the budget and explain any variation in expenditure where this is +/- 10% of the budget.

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

[I agree for ECTF and the Darwin Secretariat to publish the content of this section](#) (please leave this line in to indicate your agreement to use any material you provide here)

Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2006/07

Project summary	Measurable Indicators	Progress and Achievements April 2006 - March 2007	Actions required/planned for next period
<p>Goal: <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>Purpose Assist in the ability of Botswana to implement CBD in the OD region, through programme of capacity building, training and scientific research.</p>	<p>By end of yr 3:</p> <p>HOORC staff appointed and trained.</p> <p>New knowledge on (i) aquatic ecosystem functioning (ii) hydrological responses to future climate and development scenarios. Key IBIs and predictive models developed.</p> <p>Long-term biodiversity monitoring programme established based on IBIs</p> <p>Inputs to ODMP complete.</p>	<p>These are all progressing well and on-time and on budget</p> <p>Abstract submitted to BES meeting, Glasgow 2007</p>	<p>Continuation of fieldwork sampling for biological organisms and water chemistry</p> <p>Further climate and hydrology model development</p> <p>Further training at HOORC in diatom diversity and multivariate techniques</p> <p>Production of training video based on sampling currently being carried out</p> <p>Preparation of manuscripts for publication</p> <p>Compilation of IBIs and hydroperiod</p>

<p>Output 1. Acquisition of extensive baseline aquatic biodiversity and water quality data across hydroperiod gradients in OD.</p>	<p>Within 1st 6 months of project: Candidate field sites (up to 100 for contingency) identified from existing 15 year satellite derived flood maps and local knowledge.</p> <p>By mid Yr 2: Datasets of baseline aquatic biological diversity archived. <u>Contributions to UNDP GEF Wetland Biodiversity project underway</u></p>	<p><i>Candidate locations were chosen from satellite data and local knowledge within the first 6 months, and specific sites are being located as fieldwork progresses. We are well on our way of reaching our target of 100 locations. The final fieldtrip will take place this autumn, and we aim for all analyses to be undertaken within Year 2 of the project.</i></p>
<p>Output 2. Development of robust Indices of Biological Integrity (IBIs), sensitive to hydroperiod</p>	<p>By end yr 2 IBIs developed and tested, and statistical models relating IBIs to hydrology developed.</p>	<p><i>This work has still to be done once all biological data have been collected</i></p>
<p>Output 3. Development of future scenarios of OD flood frequency, extent and duration and biodiversity response</p>	<p>By mid Yr 3: Multiple 20 yr datasets of monthly river discharge and OD flood will be created using hydrological models, from scenarios of climate change/water abstraction.</p> <p>Initial prediction of resulting IBI</p>	<p><i>This work is ongoing, and forms the basis of the UCL PhD thesis (Todd as supervisor) and research by Wolski.</i></p>
<p>Output 4. Establishment of on-going systematic biodiversity monitoring programme based on identified IBIs.</p>	<p>Staff trained. Monitoring equipment procured.</p> <p>In yr 3 monitoring programme initiated.</p>	<p>Staff have been trained at HOORC, and this is an on-going process Equipment suitable for monitoring studies have been purchased and are being used on each fieldtrip</p>
<p>Output 5. Dissemination of results</p>	<p>Datasets compiled in dual archive at HOORC and UCL, accessible to all. Project website established at UCL. Journal and conference publications submitted (min. 6).</p> <p>Press releases for local and</p>	<p>As datasets are being produced, e.g. biology and chemistry, they are being shared. Project website has been set up. Journal articles will be written once data are analysed</p>

	international media	Press have been informed of the project
Output 6. Training programme for staff at HOORC/IC & Botswana students completed.	<p>Min. 8 HOORC/IC & 4 <u>Government staff</u> trained in key aspects of project science.</p> <p>Min. 2 HOORC academic staff trained in UK.</p> <p>2 UB Masters by research in Yr 2.</p> <p>UB students trained during HOORC Winter School (up to 10 per yr).</p>	<p>HOORC and Government staff have been trained in data collection methods used as part of this programme, with a view to biomonitoring</p> <p>3 HOORC staff have been trained on specialist organism courses in the UK (4 courses in total)</p> <p>so far 1 UB Masters student has been secured. We have not been able to secure as yet a 2nd UB masters student for reasons given in Section 6</p> <p>UB undergraduates have been trained at HOORC during their Winter school</p>
Output 7. Relationship of project to CBD established through ODMP initiatives	<p>Annual/final project reports produced for ODMP.</p> <p>Presentation at meeting with ODMP.</p> <p>Workshops at start and end of project (ODMP and stakeholders).</p> <p>Report submitted to the tri-nation Permanent Okavango River Basin Water Commission (OKACOM).</p>	<p>Annual report will be submitted to the GEF BIODIVERSITY co-ordinator Dr Moleele</p> <p>Workshop was held at HOORC at start of the project.</p> <p>We will ensure that final report will be circulated to all relevant organisations</p>

Annex 2 Project's full current logframe

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p>Goal:</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"> • the conservation of biological diversity, • the sustainable use of its components, and • the fair and equitable sharing of benefits arising out of the utilisation of genetic resources 			
<p>Purpose</p> <p>Assist in the ability of Botswana to implement CBD in the OD region, through programme of capacity building, training and scientific research.</p>	<p>By end of yr 3:</p> <p>HOORC staff appointed and trained.</p> <p>New knowledge on (i) aquatic ecosystem functioning (ii) hydrological responses to future climate and development scenarios. Key IBIs and predictive models developed.</p> <p>Long-term biodiversity monitoring programme established based on IBIs</p> <p>Inputs to ODMP complete.</p>	<p>HOORC annual reports.</p> <p>Scientific publications.</p> <p>Joint partner project reports</p>	<p>Government remains committed to CBD, Ramsar, and National Wetlands Policy.</p>
<p>Outputs</p> <p>Acquisition of extensive baseline aquatic biodiversity and water quality data across hydroperiod gradients in OD.</p>	<p>Within 1st 6 months of project: Candidate field sites (up to 100 for contingency) identified from existing 15 year satellite derived flood maps and local knowledge.</p> <p>By mid Yr 2: Datasets of baseline aquatic biological diversity archived.</p> <p><u>Contributions to UNDP GEF Wetland Biodiversity project underway</u></p>	<p>Manual of field and lab protocols</p> <p>Data archive of biological and chemical data. Reports</p>	<p>Field sites accessible during periods of flooding.</p>
<p>Development of robust Indices of Biological Integrity (IBIs), sensitive to hydroperiod</p>	<p>By end yr 2 IBIs developed and tested, and statistical models relating IBIs to hydrology developed.</p>	<p>Workpackage report sent to Darwin Initiative.</p> <p>Publications.</p>	<p>HOORC Computing facilities maintained.</p>
<p>Development of future scenarios of OD flood frequency, extent and duration and biodiversity response</p>	<p>By mid Yr 3: Multiple 20 yr datasets of monthly river discharge and OD flood will be created using hydrological models, from scenarios of climate change/water abstraction.</p>	<p>Workpackage report completed.</p>	<p>Matched personnel at UCL will remain in post.</p>

	Initial prediction of resulting IBI.	Scientific publications.	
Establishment of on-going systematic biodiversity monitoring programme based on identified IBIs.	Staff trained. Monitoring equipment procured. In yr 3 monitoring programme initiated.	Workpackage report completed and sent to Darwin Initiative.	Botswana government maintains funding for HOORC.
Dissemination of results	Datasets compiled in dual archive at HOORC and UCL, accessible to all. Project website established at UCL. Journal and conference publications submitted (min. 6). Press releases for local and international media.	Data archives documented Copies of all manuals, reports, press releases and publications sent to Darwin Initiative	Computer facilities at UCL are constantly maintained.
Training programme for staff at HOORC/IC & Botswana students completed.	Min. 8 HOORC/IC & 4 <u>Government staff</u> trained in key aspects of project science. Min. 2 HOORC academic staff trained in UK. 2 UB Masters by research in Yr 2. UB students trained during HOORC Winter School (up to 10 per yr).	Training manuals Training feedback reports Attendance records for training courses Master theses	HOORC staff remain in post, and the Winter School continues
Relationship of project to CBD established through ODMP initiatives.	Annual/final project reports produced for ODMP. Presentation at meeting with ODMP. Workshops at start and end of project (ODMP and stakeholders). Report submitted to the tri-nation Permanent Okavango River Basin Water Commission (OKACOM).	Workshop minutes, presentations and feedback compiled and sent to Darwin Initiative.	Reports will positively influence ODMP

Activities	Activity Milestones (Summary of Project Implementation Timetable)
Research	<p>Yr 1: Identification of candidate study sites (up to 100) from historical 15-year satellite derived dataset of flood history, aerial photos and local knowledge. Sampling basin will be range of hydroperiod conditions.</p> <p>Yrs 1 & 2: Data collection from sites, laboratory analysis.</p> <p>Y2-3: Development of multiple high-resolution climate predictions (for 2030-50) using General Circulation and Regional Climate Models. Multiple 20-year hydrological model simulations over OD conducted, based on various (c 10) climate change and water abstraction scenarios. Development of IBI and statistical IBI models. Initial prediction of IBIs under hydrological scenarios.</p>
Training	<p>Yr 1. Staff appointed at HOORC, equipment procured.</p> <p>Yrs 1-3: Training of Batswana staff in taxonomy, field methods, advanced numerical methods, computing and climate analysis. UCL staff will visit HOORC to deliver annual 1-week courses on each component, while key HOORC academic staff will visit the UK for specialist training. Senior undergraduate students from HOORC winter school trained each year. Yr 2: 2 UB Masters research projects</p>
Dissemination	<p>Yr 1: Production of guidelines, training manuals, protocols and web site</p> <p>Yrs 1-3: Submission/presentation to ODMP. Attendance at conferences</p> <p>Yr 3: Submission of final results to international publications, ODMP, OKACOM and media.</p>
Management	<p>UCL will retain overall responsibility for management of the programme. The establishment of a web site in Yr 1 will facilitate this.</p>
<p>Project planning will be finalised at workshop at start of programme (Apr 2006)</p>	

Annex 3 onwards – supplementary material (optional)

A4 flier used for promotion in HOORC

UCL



Monitoring and simulating climate change threats to aquatic biodiversity in the Okavango delta, Botswana (Darwin 14-029)



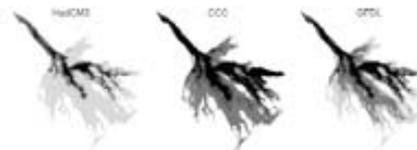
Project partners: University College London (UK) and HOORC (Botswana)

Project Aims

- to establish baseline and long-term monitoring of aquatic biodiversity in the Okavango Delta
- to simulate future climate change impacts on Okavango Delta biodiversity
- capacity building in aquatic ecological assessments

Methods 1: Climate/hydrological simulation

- Hydrological models forced with multiple future climate scenarios from GCMs
- Provides future estimates of flood frequency and duration for all locations in the delta



Methods 2: Assessing aquatic diversity: an ecosystem approach



- Determining functional relationships between aquatic organisms and their environment are key to modelling potential impacts from future climate change
 - up to 100 sites spanning both temporal (seasonal) and spatial (hydroperiod) gradients are being investigated for a range of biological groups and related explanatory variables

- Measurement of physical (e.g. water depth) and chemical (e.g. alkalinity, PO_4) parameters at each site on a seasonal basis
- Sampling of the aquatic flora and fauna including diatoms, phytoplankton, zooplankton, macroinvertebrates and submerged and emergent macrophytes
- Explore relationships between biology, hydrology and climate with view to determining significant relationships from which to develop predictive models



Further information contact:

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Checklist for submission

	Check
Is the report less than 5MB? If so, please email to Darwin-Projects@ectf-ed.org.uk putting the project number in the Subject line.	X
Is your report more than 5MB? If so, please advise Darwin-Projects@ectf-ed.org.uk that the report will be send by post on CD, putting the project number in the Subject line.	
Do you have hard copies of material you want to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number.	
Have you completed the Project Expenditure table?	X
Do not include claim forms or communications for Defra with this report.	