Darwin Initiative – Final Report

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

Darwin project information

Project Reference	14-060
Project Title	Sustainable Management of Ornamental Fish in Mamiraua, Brazil.
Host country(ies)	Brazil
UK Contract Holder Institution	Zoological Society of London
UK Partner Institution(s)	Zoological Society of London
Host Country Partner Institution(s)	Socidad Civil Mamiruau
Darwin Grant Value	£218,000
Start/End dates of Project	June 2005/ 31 March 2009
Project Leader Name	Alison Debney nee Shaw
Project Website	http://www.mamiraua.org.br/peixesornamentais/br/principal.php?cod=9
Report Author(s) and date	Alison Debney March 2009

1 Project Background

The protection of fish biodiversity in the Brazilian Amazon through the development of a sustainable trade in ornamental fish; achieved by establishing a pilot project in the Mamirauá Sustainable Development Reserve (MSDR) and the Amanã Sustainable Development Reserve (ASDR). The trade will result in direct economic benefits to the rural communities, and the monetary value, along with the establishment of a sustainable system, will encourage the long-term protection of fish diversity.

Outstanding achievements include the organisation and strengthening of the Reserves' fishing communities; increased knowledge on the fish populations and diversity, and a burgeoning sustainable ornamental fishery.

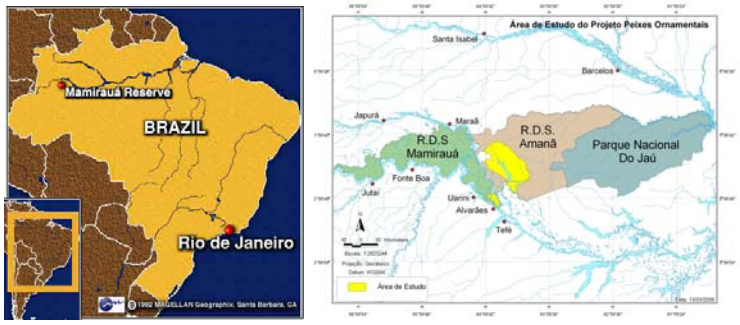

Figure 1: Project location

2 Project support to the Convention on Biological Diversity (CBD)

The ornamental fish project has supported the CBD objectives through the conservation of the biological diversity of the Amazonian rainforest through the sustainable use of its components; the fish. Articles that the project particularly supported include:

Article 7 Identification and Monitoring. Much of our field activities were groundbreaking in that the detail at the 'small' fish fauna of *varzea* (flooded forest) and black water habitats of the SDRs had never previously been investigated – identifying and monitoring previously unknown /unstudied populations. Life histories of at least 16 fish have been described, which will allow the effective management of the populations, minimising the risk of adverse impact through extraction;

Article 8 In situ conservation Ensuring the compatibility between the sustainable use of resources (ornamental fish) and their conservation whilst protecting the traditional lifestyles of and knowledge of biological resources of the riverine communities in the Brazilian Amazon;

Article 10 Sustainable use of Components of Biological Diversity The project contributed to raising awareness of the importance of the ornamental fish trade for the riverine populations in the Amazon to the national decision makers. As such, the national government environmental bodies issued research contracts to investigate further the contribution to national productivity; developed management plans for some of the threatened fish species (arowana) and revisited the list of species suitable for export. The project encouraged cooperation between the government and trade, in this case live fish exporters, which can be seen from some of the outcomes above.

Article 11 Incentive Measures At the core of this project was the feasibility study to determine if the collection of ornamental fish was an economically, socially and well as environmentally sound incentive to conserve and promote the conservation of biological diversity within the Sustainable Development Reserves (SDRs). It was concluded that, at a small scale, they were.

Article 12 Research and Training Running through out the project was the training of young Brazilian biologists and ichthyologists. This included high school students through to PhD researchers. The main learning points were the importance of the forest for fish populations and how the fish populations were an essential component of the forest. Field trips, lab work and taught courses were conducted. Two PhDs have commenced which will contribute to the conservation and sustainable use of biological diversity in Brazil as well as three Masters candidates.

Other articles that the project supported in a minor way were the *Public Education and Awareness* through website and magazine articles, presentations, through the ZSL London Zoo Aquarium and *Article 17 Exchange of Information* between the neighbouring countries (Peru, Columbia, Guyanna) on the trade in ornamental fish.

The 2010 biodiversity target is to achieve a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth. This target effectively encapsulates the project purpose. The project contributes to the focal goals of: *Goal 1 effective conservation of biological diversity of ecosystems, habitats and biomes* including the unique varzea habitat (target 1.1), which is an area of particular importance (target 1.2); *Goal 4* the projects *promotes the sustainable use and consumption* of biodiversity based products with appropriate management plans consistent with the conservation of biodiversity (target 1.). *Goal 8 Maintain goods and services from biodiversity to support human well being* has been contributed to notably through the conservation of biological resources that support sustainable livelihoods of poor people (target 8.2). Finally, the local communities have benefitted through the access to benefit sharing (target 9.2) as set out in *Goal 9 Protect traditional knowledge, innovations and practices.*

The project also contributed to the Inland Waterway Programme; Forest Biodiversity Programme and the following cross-cutting themes: Identification, Monitoring, Indicators and Assessments; Communication, Education and Public Awareness; Economics Trade and Incentive Measures; Protected Areas and Sustainable Use of Biodiversity.

The host-country institution already had the capacity to meet Brazil's commitment to the CBD but the project helped build the capacity of Brazil through the development of conservation professionals and researchers to contribute to the CBD.

The project had significant contact with the CBD host country coordinators and UK coordinators during CBD Conference of Parties (COP) 8, Curitiba in 2006. The host country partners held a stall at the event, the project gave a lunch time presentation organised by DEFRA. The UK Minister for Biodiversity also visited the project at this time and he promoted the concepts it was trying to achieve at the CBD COP 8, which was well received.

3 Project Partnerships

The relationship between the two organisations was established prior to the project through contact between Directors. The project partnership was formalised at the outset of the project through a detailed Memorandum of Understanding (MoU). The project partnership has functioned over the life of the project but will not continue post Darwin Initiative in the same formal capacity. Opportunities to broaden the scope of work have been investigated.

The partnership was based on the need stemming from the host country for expertise in an area that was new to them and outside the current portfolio of work. All partners were involved in the project planning stage and implementation. The host-country partner is responsible for the effective running of the SDRs and so was always very aware of the procedures developed for the effective management of the areas and this was incorporated into the project approach. The clear delineation that all project activities that took place within or that would impact the SDRs being the sole responsibility of the host-country partner, whilst respected, did lead to some difficulties in the sharing of expertise and knowledge on the certain components of the project. Likewise there was a frustration of dependency on the UK organisation for access to commercial components of the project. It would have been best to work together on all aspects.

Another challenge was finding a suitable project manager to coordinate the project. This was due to the conservation industry being relatively new in Brazil and whilst there are many academic researchers, it was very difficult to find staff with experience in or interest to take the position of project manager as it was not a research post. Pay scales were in keeping with the staffing structure of the host-country partner which was appropriate but meant experienced project managers would not accept the remuneration package, in addition the location in the small town of Tefe was not appealing to many. Eventually, a research scientist was recruited who was effective in the role which made project implementation much easier.

A relationship was built in the UK with OATA; the Ornamental Aquatic Trade Association, who helped the project team build relations and promote the project to the commercial establishments in the UK.

4 Project Achievements

4.1 Impact: achievement of positive impact on biodiversity, sustainable use or equitable sharing of biodiversity benefits

The project goal was 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:

- 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

The contribution to achieving the DI project goals are set out below under the headings of the desired impacts. The impacts contributing to Brazil achieving its national strategy for the

conservation of biodiversity and its responsibility towards the CBD are highlighted in italics. [Brazil is a signatory of the CBD, and is implemented through the Presidential decree of 3rd February 2004. The Brazilian Agenda 21 is the official document used by the Ministry of Environment to implement its national strategy for the CBD. The document encourages regional and non-governmental initiatives that seek to achieve sustainable ways to utilise biological resources].

a) A change in state of an element in biodiversity; species, population or habitat loss reduced, etc

Chapter 15: To conserve biological diversity by improving the conservation and sustainable use of biological resources in conjunction with needs identified by CBD and to ensure fair and equitable share of benefits and biological resources. To improve the scientific understanding and economic importance of biological diversity and its function in ecosystems.

This project has focussed on improving the scientific understanding and economic importance of fish biodiversity within the Brazilian Amazon. It has centred on research areas that had not been looked at before in the region. The wealth of information that the project has developed has contributed to conserving biodiversity of the waterbodies of the Amazon by allowing conservation management plans to be developed and encourage sustainable use of the biological resources whilst securing its biodiversity and richness. This project also allows the equitable share of benefits and biological resources by the communities in the region.

b) Transition from unsustainable use to sustainable use;

Chapter 2: *International support for sustainable development by promoting sustainable development though the liberation of trade and by establishing reciprocal support between trade and the environment*.

This project has contributed to achieving this through raising the profile of the ornamental fish trade on the Brazilian government agenda. The project has encouraged the national and regional governments to put into place improved management measures to ensure sustainability, including reviewing the species list allowed for export (August 2008) and development of sustainable management plans for certain fish species. Consequently, research projects have also been commissioned by the government on the impact of the industry and its controls. This involves trade and environmental bodies working together on the subject, which should contribute to efficiency and sustainability.

Chapter 8: To integrate the environment and development in decision making with the use of economic tools and market incentives

By developing the Collection Area Management Plan for the extraction of ornamental fish from the reserves, in addition to further species management plans, the environment and development has been integrated into decision making process for the trade in ornamental fish formalising the environmental considerations. There is a market incentive in trying to promote 'green' fish – sustainably collected fish

c) Relevant human community living with biodiversity had its costs reduced or benefits increased stemming from the conservation of that biodiversity

Chapter 3: To fight poverty by income generation and greater control over local resources by local people, backing local institutions and providing institutional and technical strengthening an increased involvement in NGOs and local authorities as agents of this implementation. To develop healthy and sustainable management strategies for the environment within poor areas, thereby protecting resources, reducing poverty and generating employment and income.

In October 2008, the pilot collection and trade of fish from the Amana SDR demonstrated that it would be feasible for the communities to generate income sustainably from ornamental fish stocks within a controlled management structure (see logframe). The institutional strengthening of the NGO and the community associations provided the technical and

organisational support required. The Collect Area Management Plan will allow the communities to continue the collection in the future to supplement their livelihoods, currently below the Brazilian poverty line, and so contribute to reducing poverty whilst protecting resources.

Chapter 7: To promote the sustainable development of human settlements by building institutional and technical capacity

The communities within the settlements of the SDRs have has their institutional/organisational capacity strengthened and technical capacity both contributing to the sustainable management of the region.

Chapter 27, The participation of local people in the definition of priorities and in decision making for sustainable development

The project had the local people at the heart of it in their roles as custodians of the environment. Through the management structure within the reserves, the communities contributed to the decision making process and prioritisation. All activities were undertaken with the consent of the communities.

4.2 Outcomes: achievement of the project purpose and outcomes

Report on whether, or to what extent, the project achieved its purpose and its outcomes. Outcomes can be described as changes in human behaviours towards biodiversity, as well as access to different kinds of assets (knowledge, money, physical resources, and social networks).

The project purpose was: populations of ornamental fish species in MSDR protected through management within a sustainable ornamental fishery, made possible through strengthened capacity of fishers, local community, researchers, reserve managers and national and international traders

The project achieved its purpose. Outcomes of the project include the following:

- Increased knowledge about the fish species of the Brazilian Amazon, their ecology, behaviour and life history.
- Increased capacity within Brazilian conservation and science disciplines through the training of ichthyologists and conservation professionals.
- Increased capacity of local people to manage the natural resources and a strengthened organisational structure within which to do so.
- Increased awareness and possible behaviour change of UK fish aquarists and hobbyists on the impact of trade in wild caught ornamental fish.
- Increased engagement from the Brazilian government in the fish trade resulting in improved management, a more sustainable industry and research opportunities to increase knowledge.
- Income generation for the local communities participating in the project contributing to the reduction in poverty.
- Improved physical resources of the project partners in Brazil including microscopes, computers, field vessels (boats), water quality meters and other field equipment.
- Improved networks of researchers inter-organisational working in the field of the ornamental fish including those working with traders, IBAMA, INPA, Federal University of Amazonas etc.
- Increased understanding on the volume, practice and regional significance of the trade in the Amazon basin
- Improved animal husbandry skills

4.3 Outputs (and activities)

The project achieved all outputs in the in the logical framework except for the publication of a best practices report for the industry. This was because it was deemed that there was not such a gap between theory and practice in Brazil and because the industry published their own. A best practice manual for fishers was produced and advice given on the website.

The weakest area was probably the strengthening of the capacity of national and international traders. This was achieved through the awareness raising during meetings at conferences but it was found the level of knowledge was actually very high. This is probably due to the traders appreciating that their livelihoods depended on the continued existence of the natural resources.

It should also be recognised that the project was implemented in two reserves Amana Sustainable Development Reserve and Mamiraua Sustainable Development Reserve when the project set out only to work with the communities of the latter. This delayed the implementation process but the outputs were completed within four years.

The largest problem/hindrance the project faced was building in seasonality. On reflection, the project start date could have been shifted to accommodate this but over all it has not had a significant impact due to being able to delay the end date of the project.

4.4 Project standard measures and publications

Please see Annex 4 and Annex 5.

4.5 Technical and Scientific achievements and co-operation

The project was underpinned by sound science throughout. All decisions were made on the findings of the scientific research. The project team was largely made up of biology and social scientists including the following roles: chief scientist; chief sociologist principle scientist, researcher (biology); researcher (sociology), junior researchers (biologists x 4 approx); field assistants.

The survey methods and many of the findings (biological and social) can be found in the Annexes.

The reports include the following:

- Trade analysis; UK, Brazil and regional
- Socioeconomic methods, findings and indicators;
- Biological methods; findings and interpretation are incorporated into the Collection Area Management Plan.

The findings have been subject to peer review where formally published and can be found in annexes.

4.6 Capacity building

The capacity of Brazil for further biodiversity work has been increased through the training of at least 17 biologists/ichthyologists and socio economists. In addition to this, over 40 high school students were trained in field ecology, with at least two going on to higher education to study biology. These students were taken on by the project as interns. Theses and dissertations submitted as outputs of this project are listed below. The two PhD students are yet to submit but will do so over the next couple of years.

Theses, Dissertations and Monographs:

2007

Jana Menegassi Del Favero (2007). Biologia reprodutiva do ciclídeo neotropical Heros efasciatus (Osteichthyes: Perciformes: Cichlidae) na Reserva de Desenvolvimento Sustentável

Amanã-AM visando o manejo sustentável da espécie. Universidade Federal de Lavras. Departamento de Biologia. Monografia de Bacharelado. 30 p.

Marília Lourenço dos Santos (2007). Estudo da comunidade de peixes do capim flutuante do Paraná do Apara, Reserva de Desenvolvimento Sustentável Mamirauá. Universidade Federal de Lavras. Departamento de Biologia. Monografia de Bacharelado.

Liana Sisi dos Reis (2007). Estudo da comunidade de peixes em poças de inundação formadas na mata de várzea da Reserva de Desenvolvimento Sustentável Mamirauá, Amazonas, Brasil. Universidade Federal de Lavras. Departamento de Biologia. Monografia de Bacharelado.

2006

Rose Cristine Queiroz Chaves (2006).Diversidade e densidade ictiofaunística em lagos de várzea da Reserva de Desenvolvimento Sustentável Mamirauá, Amazonas, Brasil. *Universidade Federal do Pará - Programa de Pós-Graduação em Ciência Animal*. Dissertação de Mestrado. 69p.

2005

Patrícia Fracaroli Canholi (2006). Variação do espaço temporal das familias Serrasalmidae e Anostomidae nos bancos de Macrófitas Aquáticas nos Lagos da RDSM. Universidade Estadual Paulista. Monografia de Conclusão de Curso de Zootecnia.

Ronald Cristóvão de Souza Mascarenhas (2005). Teste de Eficiência de Diferentes Itens na Composição da Dieta de Aruanã (Osteoglossum bicirrhosum, Pisces; Teleostei, Osteoglossidae) em Cativeiro, Baseados em Aspectos da sua Alimentação em Ambiente Natural. *Universidade Federal do Pará - Programa de Pós-Graduação em Ciência Animal*. Dissertação de Mestrado.

Rui Chaves Filho (2005). Composição da Dieta Natural e Seu Efeito Sobre a Coloração Nupcial de Astronotus ocellatus, Cichlidae *Universidade Federal do Pará - Programa de Pós-Graduação em Ciência Animal*. Dissertação de Mestrado.

It must be noted that some of these outputs were joint with SCM sponsor - Petrobras.

This project has enabled the host country partner to fulfil its responsibility as the supporting institute behind the two sustainable development reserves. The project has provided SCM with the resources and capacity to meet the needs of the communities who live in the reserves and their request to establish an ornamental fishery. It has thus provided and enabling environment and the development of incentives for the communities to maintain the sustainable management of the reserves. The evidence for this is provided by the communities successfully catching fish, logging them, taking them to market and selling them for a profit, albeit supported by SCM.

The host country partners' capacity and reputation has also increased in this particular field and evidence of this includes them being requested to write a management plan for an ornamental fish species, arowana by the Brazilian government. They now have a team designated to ornamental fish within the institute, an area formally overlooked. The project has also allowed the host county partners to expand their network of contacts and collaborators within the Amazonian region including collaborative scientists working on similar fish species.

Administrative support has also been provided by the Darwin Initiative as well as resources such as field and lab equipment and transport. This will increase their capacity to complete further fieldwork.

4.7 Sustainability and Legacy

The project achievements that are most likely to endure are the training and provision of experience to young ichthyologists, the new knowledge gained on species ecology and life history, application of this within the management of the sustainable development reserves. The staff of the project will continue with other projects including with ornmamental fish, which is now a unit within SCM. Two team members are going on to register their PhD's in ornamental fish related subjects. Others will complete their MSc theses. The field staff will be transferred to other field projects. The resources will be used for further research and

management of the sustainable development reserves and within the Ornamentais (ornamental fish) department of the SCM. Partners will remain in contact but it is unlikely that further collaborations within this current set up will be sought. There are continued links between other sections of the organisation. This may be expanded if ZSL's new centre for aquatic conservation, Biota, is able to recommence, (currently dormant due to the wider regeneration scheme in east London being put on hold because of the credit crunch). This new aquarium was to feature Mamiraua and the project as one of its major biomes.

5 Lessons learned, dissemination and communication

Some of the key lessons to be drawn from the experience of this project are the difficulties in working in two languages and how the subtleties of cultural differences get lost in translation. Institutional differences in approach to work can also lead to difficulties. These are largely addressed by being generous and realistic with the timeframe for implementation and the outcomes which would give a buffer to allow adequate time to work through any misunderstandings. A realistic timeframe needs to be built into the logframe from the outset and not try to overpromise to secure the funding.

The information relating to project achievements has been disseminated though the organisation websites, at conferences and through media reports. The target audience was ornamental fish traders and hobbyists, as well as the scientific/conservation community.

ZSL London Zoo has designated a Hall to the project and now houses a new Amazonian exhibition with interpretation, which has over 1 million visitors per year. The floating aquarium/research and educational facility has been refurbished and extended in the Reserves which will be used to disseminate information about the ecology of the area and the project findings. It can also be used as an educational facility for the fisher communities. The floating aquarium is also visited by tourists visiting the reserves to learn about the fish life.

Dissemination will continue after the end of the project and may even be ramped up in connection with the marketing of the sustainable ornamental fish.

5.1 Darwin identity

The Darwin Initiative has been publicised at the following events and by using the logo on the following media:

- Project vehicles (boats) have the Darwin Logo on
- Project and organisational websites
- International and national conferences including CBD, OATA, BIAZA (British and Irish Association of Zoos and Aquaria), SCM, Royal Society Summer Exhibition
- Convening events at respective organisations such as ZSL Scientific Meetings; Mamiraua annual meeting
- Acknowledgements in reports and papers
- ZSL's annual report and enews
- Media outputs
- Case studies in Masters courses
- Biota (see above) publicity materials
- ZSL London Zoo Aquarium

In the UK the Darwin Initiative was recognised as a distinct project. In Brazil, if formed a major part of the Ornamental Fish group of SCM, earlier and continued funding came from Petrobras. The Darwin Initiative is known by our project partners in Brazil as the leader studied in the UK and works with UK academics. In Brazil, Darwin is not widely recognised and is described by us as UK government's' contribution to achieving the CBD.

6 Monitoring and evaluation

The new logframe as developed after the award can be found in Annex 2. This was changed in 2005 and has been followed without change since then.

Biological, social and economic baseline information was collected. This baseline information was then used to set indicators within the project such as sustainable extraction levels, income generation levels etc in addition to the logframe indicators. Measureable indicators were established during project design stage. They were useful with regard to ensuring continued progress towards project completion especially at output level and were designed to encompass the activities. At the higher project purpose and goal level, they weren't so useful on a day to day purpose and were really only referred to during annual reviews and in disseminating outcomes. The indicators established from the baseline surveys will ensure the true sustainability of the project in the longer term to avoid over extraction etc.

The logframe did provide a useful framework for project implementation. It provided transparency in project planning and a clear designation of responsibility. It is easy to be over ambitious during project planning stage and write in too many outputs.

Internal evaluation of progress was made biannually; i) during the annual project team meeting ii) during end of year reporting to Darwin. Progress was also checked during visits of UK Project Leaders to Brazil. No external evaluation was made aside from Darwin reviews.

6.1 Actions taken in response to annual report reviews

The project review identified that critical to the ultimate success of the project was whether it would be ultimately feasible to establish a trade in ornamental fish managed by the communities of the Reserves. In late 2008, a successful pilot run was completed; from the collection of the fish by the fisher group to their sale. Seven hundred and seventy six discus were sold. A buyer from Tefe contacted the project after solicitations and this buyer was passed on to the fishermen group. The leader of the fishermen was provided with the information to conduct a negotiation with the buyer, and then was left to do it. The project tried not to interfere with the negotiations. In the matter of "price", the fisherman was really shy and ended up accepting the first offer. Fishes classified as regulars were sold for R$1.50 per unit. Fishes classified as "semi-painted" were sold for R$8.00 a piece, and animal classified as "royals" were sold by R$10.00 a piece. The total amount of the trade was R$2,800. It was considered that there was room for an increase; however with the shyness of the fishermen leader it became impossible to raise this value. The buyer was a representative of J.A.Loureiro an ornamental fish exporter from Manaus that has been acting in Tefé for years.

The inaugural sale advanced the capacity of the fishing group, and established a minimum price agreement (even if the buyer classify the animals in cheaper categories, he won't pay less than what was first set; and if the classification is made in more expensive categories, he accepted to pay the additional value). In addition, the buyer (a) assumed to pay the taxes (17% of transaction cost), (b) assumed the task of issuing IBAMA's authorization for transport of live animals, (c) assumed the expenses of transportation from the reserve to Tefé, and (d)assumed the custody of the animals from Tefé (and the costs for transportation to Manaus).

The item "c" above was especially strategic in turning the price, although very low, profitable for the fishermen and was better than had been offered in Manaus which would have led to a loss. Almost all of the expenses of this trial fishery were assumed by the project but this enabled a full cost evaluation of the process.

With these data, and data of the trade value, a modified business plan was built using a template from a Brazilian small enterprise scheme. Through trialling the various scenarios, taking into consideration fish losses due to escapees and being heavily predated, the fishing event was profitable. In this specific case, around R$ 2,500 (~£770) will be shared by the fishermen an average daily payment of over R$55 (£17). The collection took three days, which included collecting other species subsequently released. The average monthly income for households in the ASDR is R$547 (£167) so the inaugural fishing activity accounted for 2.5% of the annual income.

These estimates include the *Apistogramma* collected (and later released), and so without this the profitability further increases. The result of the business plan, that included all the investments as the fishermen would need to make, indicates that in this first season the balance point was reached and surpassed, and that there was a small surplus. However, the investment return (if the fishermen would afford with everything that the Project paid to prepare the fishing event, equipment purchase, etc.) would only occur in about 70 months (about five years). In a less strict scenario, in which it does not include the outboard engines and more expensive equipments, the return time is much shorter. This fishing event was an exercise of assessment of the activity's feasibility that we consider very useful, and can help us in the management of the Project and to help the fishermen in the next years.

The pilot study highlighted the need to have a simple a sales mechanism as possible, and whilst the project was ambitious in trying to be able to track the fish from the source to the end user, this would be for the benefit of our organisations and not necessarily the fishers. If the fish are sold at the source, i.e. so the buyer assumes all transportation and logistical costs, this is the point ownership and thus responsibility is transferred and so there are less economic liabilities for the communities making it much simpler.

Contacts were made with UK traders who showed some interest. As has been the case through out the project, the species list wasn't considered that exciting and so traders weren't overly eager to purchase the fish. There was also the chicken and egg scenario of them wanting to see the fish before purchase and the other end wanting to secure a purchase before sending the fish. In addition, the number of fish that would need to be collected and transported to meet demand and costs was deemed beyond the scale of the CAMP and the capacity of the fishing group.

Whilst selling the fish at source means that there will be no control over fish welfare, (although as much due diligence was undertaken as possible to ensure the purchasers were of high standards), it means there will be limited support required in the long run for the on-going business. It also means that a premium for 'fair trade /green' fish cannot be charged – although this was yet to be tested and has not yet been ruled out.

With the simple chain of custody and the local buyers, it is likely that a sustainable trade in fish will continue at a small scale that will supplement the income of the impoverished fishing communities. The successful pilot means that there is the motivation on the part of the fishers and the host country partner to continue.

A fundamental principal of a Sustainable Development Reserve is that the impact of any extractive or possibly damaging activity must be monitored. Therefore, if the trade in ornamental fish continues, it must be under the management mechanisms put into place in the CAMP. This includes a logbook system and monitoring (biological). The host country partner is quite experienced in ensuring that the communities that benefit contribute to the costs of this management and that it is not totally subsidised by Mamiraua. The logbook system will allow the numbers of fish collected to be documented. This will give indication of levels of income coming into the fisher households even if there aren't the resources to undertake detailed socioeconomic surveys.

On-going support to the communities in the trade negotiations will be provided by the management structure of the Reserves and so it is hoped that this will be able to support the fishing group in the coming years. There is the will and commitment of the host country partners to do this, albeit it is a verbal commitment. The structure of the SDR set up means that there is always the support mechanism for the communities who live on the reserves and should not have much cost implication. ZSL will also provide assistance as is requested especially if contact with international elements of the trade is required.

The Darwin reviews have been shared with the project partners.

7 Finance and administration

7.1 Project expenditure

Item	Budget	2005/6	2006/7	2007/8	2008/9	Total
Salaries						
Rent, rates, heating, overheads etc						
Office costs						
Travel and subsistence						
Printing						
Conferences, seminars, etc						
Capital items/equipment						
Survey equipment						
Holding facilities						
Survey boat and engine						
Computer						
Website						
Other costs						
Bank charges						
Recruitment costs						
Audit						
Total						

Staff	Budget	2005-6	2006-7	2007-8	2008-9
Alison Shaw, Project Leader and Manager					
Henrique Lazzarroto, Project Manager					
Greg Prang, Trade Analyst					
Clarice Santos, Administrator					
Alexander Hercos, Biologist					
Marluce Mendonca, Sociology coordinators					
Leonardo Carneiro Mattos, Sociology coordinator					
Community Promoters (3)					
Biologist – Raimundo Nonata					
Biologist – Renaison Ajauro					
Biologist – Carolina					
Biologist – Sebastao					
Biologist – Camila					
Biologist – Nuglia					
Biologist - Rose Chaves					
Biologist - Marcela Viera					
UK trade analyst					
Total Salaries					

Capital items include/; refurbishment and construction of aquarium in the Reserve for promotion of the projects and as a facility to promote the sustainable fishery and as an educational resource; holding facility for collected fish in the Reserve; field camps for the fishers; equipment for the newly established ornamental fish research laboratory including computers (2); microscope with camera; histology equipment; water heaters; water quality meters; cameras (2); GPS (2); establishments of reference collection; survey vessel.

Over/Under Spend

Travel

The significant overspend in the final year was required to bring trainers into the Reserve to conduct training courses for the fishers. This included bringing fishers from the Rio Negro and specialist veterinarians. Funds were also spent taking the scientists and fishing leaders from the Reserves to Manaus to promote the fish to the exporters. The project manager/senior biologist also came to the UK from Brazil to learn about fish husbandry at the ZSL London Zoo aquarium and attend two ornamental fish industry/aquarist conferences to promote the project.

Capital

The project period, the information technology capacity of SCM increased and it was possible to build the website in-house. This enabled the capital funds to be spent on fitting out an ornamental fish research laboratory. The person skills and time required to build the website were given in kind by SCM.

Printing

Project documents are available electronically thus saving on printing costs. Further more, the best practice guidelines that were to be produced have been published by the OFI, the ornamental fish industry.

7.2 Additional funds or in-kind contributions secured

Additional funds were provided by Petrobras (undisclosed by our partners)

A donation of £2,000 was received from a ZSL fellow

Approximately £770 was generated from the revenue from the sale of the fish but this went to the fishing communities.

In-kind contributions were made by staff time including for website production.

7.3 Value of DI funding

In addition to all of the above, the DI funding has enabled the host country partners to respond the requests of the community who live in the reserves to investigate the feasibility of establishing a trade in ornamental fish and on finding that a small scale industry would be viable, helped them implement it thus contributing to poverty reduction and securing biodiversity of the region. This would not have been possible without Darwin's contribution. The project also allowed the host country to have greater understanding of the ecology of the reserves that they manage, which will enable them to manage them with a fuller understanding of the consequence of any anthropogenic activities or environmental change.

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

Project summary	Measurable Indicators	Progress and Achievements April 2007 - March 2008	Actions required/planned for next period
Goal: 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 • 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		(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)	(do not fill not applicable)
Purpose (insert original project purpose statement)	(insert original purpose level indicators)	(report on progress towards achieving the project purpose, ie the sum of the outputs and assumptions)	(Highlight key actions planned for next period)
Output 1. (insert original outputs with activities relevant to that outputs in lines below. Activities relevant to more than one output should be cross-referenced rather than repeated)	(insert original output level indicators)	(report general progress and appropriateness of indicator)	
Activity 1.1 insert activities relevant to this out put		(report completed or progress on activities that contribute toward achieving this output), and what will be carried out in the next period	
Activity 1.2, etc			
Output 2. (insert original output)	(insert original output level indicators)	(report general progress and appropriateness of indicator)	
Activity 2.1.			
Activity 2.2. etc			
Output 3. etc,			

Project summary	Measurable Indicators	Progress and Achievements at the end of the Project	
Goal: *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* *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*		*(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)* Drawing on expertise from within the United Kingdom (UK) and through working with local partners in Brazil contributions have been made to the conservation of biological diversity through the increased understanding of species richness and abundance and life histories of the species that occur in important habitats of the Brazilian Amazon and awareness raised of their importance. The project has undertaken a feasibility of the sustainable use of its components and has deemed it appropriate for small scale utilisation of the biodiversity products with in a sustainable management structure and for the benefit of the local communities, custodians of the reserves.	
Purpose: Populations of ornamental fish species in MSDR protected through management within a sustainable ornamental fishery, made possible through strengthened capacity of fishers, local community, researchers, reserve managers and national and international traders.	Ornamental fish populations in MSDR remain at natural levels whilst accommodating controlled sustainable extraction of selected fish species by May 2008. Two organised Community Associations have demonstrated capacity to implement and manage the sustainable extraction of ornamental fish from within MSDR by May 2008. Best Practice Guidelines adopted by all links in the supply chain from MSDR to retailer by May 2008 to ensure the sustainable trade in ornamental fish.	The biological surveys and research have supported the development of the sustainable management plans. The Collection Area Management Plan (CAMP) is completed and has been implemented in Amana and is due to be implemented in Mamiraua during the collection season in 2009. In 2008, five organised communities in Amana Sustainable Development Reserve (SDR) working as a fishing co-operative demonstrated the capacity to collect ornamental fish, hold them and ship them to Tefe and trade them with a fish exporter for a profit following the principles of the CAMP. The principles of best practice have been adopted within the supply chain of the ornamental fish from the reserves to the exporter as demonstrated in October 2008.	
Output 1. 1. Biodiversity of ornamental fish species in MSDR assessed, and a standardised, repeatable monitoring programme established. [Populations of ornamental fish in the MSDR are maintained at a natural level.]	1.1 MSDR ornamental fish population surveyed to document species present and population abundance within the designated fishing zones. The results written up and disseminated by May 2006.	MSDR and ASDR ornamental fish populations surveyed with relative abundance figures defined. The results have been fed back to the communities. Detailed research into the life history of at least 16 ornamental fish species. The research has been incorporated into the Reserves management plans.	

Project summary	Measurable Indicators	Progress and Achievements at the end of the Project
	1.2 Ornamental fish stock monitoring protocol completed by August 06 for the Collection Area but which may be applied in a wider Amazon context. 1.3 Collection Area Management Plan (CAMP) for ornamental fish extraction completed by April 2008 to ensure its sustainable management. 1.4 At least four biologists trained in scientific survey techniques to assess and monitor fish populations through three training courses run by Head Scientist on an annual basis commencing August 05.	Ornamental fish monitoring protocol completed and has been incorporated into the CAMP. The CAMP is being used as a reference for fish management plans in the wider Brazilian Amazon including for the arowana fish. The Collection Area Management Plans are living documents and should be regularly updated. The fish life history research outputs have been incorporated and extraction quotas have been decided for the first year of collections. The CAMP for Amana SDR is now in full use and the Mamiruau CAMP will be functioning in time for the collection season in 2009. The extensive training/capacity building programme has been continued through the project. At least 22 biologists have been trained in scientific survey techniques to assess fish populations. In addition four years of high school students have undertaken the training course.
Activity 1.1.1 Biological survey protocol approved by August 05.		Completed and incorporated into the CAMP
1.1.2 Baseline fish surveys of the designated fishing zones completed and written up by June 06.		The baseline fish surveys have been completed in MSDR and ASDR.
1.1.3: Results of the baseline biological surveys presented to the communities by June 06.		The results of the baseline surveys have been presented to and discussed with the communities of MSDR and ASDR.
1.2.1 Fish species that are ecologically and economically suitable for extraction listed.		This is a dynamic list with biological and economic factors influencing species inclusion. The current list is included in Annex 7. In this first year of trading only discus were sold, as was the market demand.
1.2.2: Biological monitoring protocol agreed and adopted by August 06.		Biological monitoring protocol has been developed and is being incorporated into the CAMP.
1.3.1 CAMP content list drafted and agreed by December 2005		Completed.
1.3.2: Supporting information for CAMP collected by project team by May 2006.		Supporting information for the CAMP has been collected. The biological information is incorporated as the findings emerge.
1.3.3: Draft CAMP completed and peer-review comments incorporated by June 07.		The Amana SDR CAMP is completed. The Mamiraua SDR will be completed in time for the 2009 collection period.
1.4.1: Biological survey team trained to follow Collection Area monitoring protocol in June 2006 to commence survey work in July 2006.		The team has been instrumental in developing the monitoring protocol and so are fully up to speed on the techniques. The new team members are trained during their inaugural field excursions.

Project summary	Measurable Indicators	Progress and Achievements at the end of the Project
1.4.2: First annual Collection Area monitoring completed and written up by May 2007.		The inaugural fish collection took place in October 2008. No monitoring has taken place since then due to it being the flood season and water levels being high.
1.4.3: This is to be repeated annually *ad finitum*.		On going
1.4.3: Biological survey team trained in survey techniques by HS July 2005, 2006 and 2007.		Over 22 biologists have been trained in survey techniques over the life of the project.
Output 2. Social and economic parameters of community determined and monitored, local knowledge and needs identified, and feedback loop established. [Increase livelihood opportunities from extraction of sustainable levels of ornamental fish lead to increased income for households in MSDR].	2.1 Households that have elected to be involved in the project benefit from an increased income of 10% due to the new fishery by 2008. 2.2 Two Community Associations have the organisational capacity to effectively manage and monitor a sustainable trade in ornamental fish in MSDR by May 2008.	The first year of trade took place in 2009 and R$2,500 (~£770) total profit was made. This was shared by the fifteen fishers (15 households) that took part. This equated to each fisher receiving R$55 (~£17) per each day worked. The collection took three days. The average monthly income for households in the ASDR is R$547 (£167) so the inaugural fishing activity accounted for 2.5% of the annual income. This will be repeated in 2009 and bodes well for achieving the 10% target if more than three days work is conducted. The two Community Associations have been incorporated as sub groups to the established Fishery Associations. The members of the Ornamental Fish Association have taken part in the training workshops conducted in 2007/08 in fish collection; community organising; fish welfare/husbandry; book keeping etc. This capacity building will be continued and support given to the fisher associations.
Activity 2.1.1 Socioeconomic survey protocol agreed by September 05		Survey protocol completed and implemented. (See Annual Report 1)
2.1.2: Communities and individuals to be involved in the project determined and agreed by December 2005.		The socio economic surveys identified those communities who were interested in establishing an ornamental fishery. The communities interested are now part of the Fishing Association.
2.1.3: Baseline socio-economic surveys of identified MSDM communities and fishers completed by May 2006.		The baseline socioeconomic surveys have been completed and 233 families were interviewed. See Annual Report 2.
2.1.4: Socio-economic monitoring protocol agreed by August 2006 that will include indicators to measure the socio-economic impact of the trade in ornamental fish on the communities.		Socio economic monitoring protocol was developed and reviewed. The socio economic indicators were refined. See Annual Report 2.

Project summary	Measurable Indicators	Progress and Achievements at the end of the Project
2.2.1: Socio-economic survey team including community promoters trained in survey protocol by October 2005.		The socio economic team continue to work with the communities of MSDR and ASDR. The junior socio economist has now left to complete her Masters course and a replacement sociologist has been recruited and fully trained up in the survey protocol.
2.2.2: Results of the baseline socio-economic surveys presented to the communities by June 06.		The results of the baseline socio economic surveys have been written up, presented to and discussed with the communities of ASDR. This was done in conjunction with presenting the biological results. See Annual Report 2.
2.2.3: Through a process of consultation, communities endorse Best Practice Guidelines[i] by September 2006.		The Best Practice Guidelines (BPG) has been presented to the communities through the workshops. A simple pictorial guide will work as a reference tool for the communities.
2.2.4: Fishers trained in Best Practice Guidelines to be independently assessed as competent by May 2008		The fishers were trained in the BPG at a collection handling workshop September 2007. Subsequent training was given by a vet to the communities. An experienced fisher was also brought from the ornamental fisheries in the Rio Negro to train the fishers in the art of catching, storing and transporting the fish.
2.2.5: Community organisations formed, officially registered and membership protocols agreed by September 2007.		The inaugural meeting regarding administration and formation of associations for the community organisations were held June 2007. The associations are now legalized. It was decided that the best approach was to establish the ornamental fishing association as a sub-group of the wider fishing within the reserves.
2.2.6: Training of designated personnel from community associations in business management, accounting reporting etc. to ensure that they are verified as competent by May 2008.		The provision of the necessary training of fishers that enables them to maintain accounts and document production activities regarding the management of ornamental fish was carried out in December 2007. Further training and support has been given by our socio-economist through out 2008.
Output 3. Market and economic potential for fishery identified, a business plan and standardised guidelines in place for trading procedure from source to end-user.	3.1 A sustainable trade in ornamental fish is established from the MSDR by May 2008.	The first trade in ornamental fish from the Amana SDR was made in October/November 2008. The studies indicated that it would be environmentally and socially sustainable if the developed management plan was adhered to. The test will be the economic side. Indicators point to a small scale collection being the most appropriate that can be undertaken along with existing livelihood activities to provide supplementary income.
	3.2 Standardised Best Practice Guidelines are adopted by May 2008 for the sustainable trade in ornamental fish from MSDR that are transferable and can be applied in a wider Amazonian context.	Best practices have been adopted by the fishing associations in their collection of fish from the reserves. The exporters were selected on the basis of their husbandry standards as were the UK retailers. In 2007, OATA (Ornamental Aquarium Trade Association) guidance on industry standards on water quality was published, which was followed earlier this year by guidance on the transportation of ornamental species. These are now the industry norm. The Best Practice Guidelines developed, although simple, can be transferred. The project website also has guidance for hobbyists.
3.1.1: Industry analysis undertaken on UK and European fish trade with particular		The UK industry analysis was completed as discussed in Annual Report 1 and 2.

Project summary	Measurable Indicators	Progress and Achievements at the end of the Project
reference to Brazilian ornamental fish. Report produced by December 2005.		
3.1.2: Industry analysis undertaken on Brazilian fish trade with particular reference to fish exported from Manaus, Brazil, by December 2005 to include current trade pathways/systems.		The Brazilian industry analysis was completed. See Annual Report 2.
3.1.3: Current and where possible future trade regulations identified by April 2006 to include taxes, custom requirements, health and welfare procedures in Brazil, UK, Europe, Japan and US.		Regulatory constraints have been investigated and where they exist, have been included as part of the trade analysis and business planning. See Annual Report 2.
3.1.4: Business plan drafted and reviewed by project team by June 2006 to include scenarios to advise selection of fish species list. Business plan to be reviewed annually.		The Business Plan is a working document that is regularly updated when results of our investigations are realised. During this final year, it was decided that a much simpler model should be used in line with the precautionary approach that has been taken to the CAMP i.e. low extraction numbers. This business model is much more low key and easier for the communities to implement independently.
3.1.5: Implementation of ornamental fish business plan by May 2008.		The Business Plan is being implemented. The first trade in discus took place in October 2008. This will be repeated during the next collection period (low water in 2009).
3.2.1: Existing natural resource certification/guidelines are assessed and potential applicability determined by December 2005.		Completed - see Annual Report 1. The findings of the research will be used to develop the Best Practice Guidelines.
3.2.2 Produce and peer review standardised Best Practice Guidelines for the sustainable trade in ornamental fish. Draft by June 2006 and Final June 2007.		Draft Best Practice Guidelines have been drafted but industry standards have been produced in this past year. These will be adopted instead.
3.2.3: Peer review standardised Best Practice Guidelines are adopted by fishers, managers, communities, traders, exporters, importers and retailers by May 2008		See above.
3.2.4: Procedures for trade documentation, verification of compliance to standards, auditing and feedback procedures developed and implemented by May 2008.		These are being developed as part of the Best Practice Guidelines.
Output 4 Fish welfare maintained from source to end user	4.1 Ornamental fish welfare secured by achieving 80% reduced mortality along the supply chain from 2008.	Our studies following the chain of custody led to the unexpected finding of low mortality during the chain of custody. The commercial need to keep the fish alive has meant that measures have already been implemented to reduce mortality as much as possible, certainly in the regions that we were working. The studies did highlight some key areas where fish mortality can be reduced, such as during the sorting process and during transport between holding stations. The implementation of simple measures such as covering the boxes has reduced mortality. Mortality rates have been measured for fish being transported from the reserves to Tefe. A mortality rate of 0.5-1% was observed.
4.1.1 Recommendations for improved welfare by May 2006. Water quality parameter standards within defined optimum values achieved on 90% of		Key areas for improvement identified during the research trip to Barcelos have been incorporated into the Best Practice Guidelines given to the fishing associations during the collection and fish handling workshops. Industry

Project summary	Measurable Indicators	Progress and Achievements at the end of the Project
shipments by May 2008		standards for water quality have now been published by OATA.
4.1.2 Best practice guidelines produced for animal welfare from capture to consumer by May 2007.		See Annual Report 2 and 3. These best practice guidelines for animal welfare were part of a training programme for the communities. It is in the interest of the trade that all fish stay alive and healthy.
4.1.3 Communities, exporters and importers implementing Fish Welfare Best Practice guidelines by May 2008		The choice of exporter has been supported by welfare considerations with the chosen exporter include maintaining best possible conditions for the fish.

Annex 2 Project's final logframe, including criteria and indicators

Project summary	Measurable Indicators	Means of verification	Important Assumptions
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** • **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**			
Purpose Populations of ornamental fish species in MSDR protected through management within a sustainable ornamental fishery, made possible through strengthened capacity of fishers, local community, researchers, reserve managers and national and international traders.	Ornamental fish populations in MSDR remain at natural levels whilst accommodating controlled sustainable extraction of selected fish species by May 2008. Two Organised Community Associations have demonstrated capacity to implement and manage the sustainable extraction of ornamental fish from within MSDR by May 2008. Best Practice Guidelines adopted by all links in the supply chain from MSDR to retailer by May 2008 to ensure the sustainable trade in ornamental fish.	Annual stock estimates from field survey reports and monitoring activities demonstrate natural sustainable ornamental fish populations in the MSDR commencing May 2006. Collection Area Management Plan (CAMP) in operation and information disseminated by June 2008. Community Associations document registered at Cartorio (central registry) by May 2008. Monitoring reports on the adoption of best practice guidelines by the supply chain by May 2008. Best practice guidelines for the sustainable trade in ornamental fish from the MSDR produced and disseminated by May 2008.	There is a market for sustainably sourced ornamental fish which is not overshadowed by improvements in captive breeding techniques or other market influences. Cooperation between stakeholders in freshwater ornamental fish trade is in existence and can be built upon.
Outputs 1. Biodiversity of ornamental fish species in MSDR assessed, and a standardised, repeatable monitoring programme established. [Populations of ornamental fish in the MSDR are maintained at a natural level.]	1.1 MSDR ornamental fish population surveyed to document species present and population abundance within the designated fishing zones. The results written up and disseminated by May 2006. 1.2 Ornamental fish stock monitoring protocol completed by August 06 for the Collection Area but which may be applied in a wider Amazon context. 1.3 Collection Area Management Plan (CAMP) for ornamental fish extraction completed by April 2008 to ensure its sustainable management. 1.4 At least four biologists trained in scientific survey techniques to assess and monitor fish populations through three training courses run by Head Scientist on an annual basis commencing August 05.	1.1.1 (T4) Biological survey protocol approved by August 05. 1.1.2 (T13): Baseline fish surveys of the designated fishing zones completed and written up by June 06. 1.1.3 (T19): Results of the baseline biological surveys presented to the communities by June 06. 1.2.1 (T8): Fish species that are ecologically and economically suitable for extraction at a sustainable level listed by May 06. Appropriate extraction methods agreed and described. 1.2.2 (T20): Biological monitoring protocol agreed and adopted by August 06. 1.3.1 (T31): CAMP content list drafted and agreed by December 2005.	Standardised survey techniques and methodologies adhered to so that valid analyses and modelling can be carried out.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
		1.3.2 (T6): Supporting information for CAMP collected by project team by May 2006. 1.3.3 (T27): Draft CAMP[ii] completed and peer-review comments incorporated by June 07. 1.4.1 (T29): Biological survey team trained to follow Collection Area monitoring protocol in June 2006 to commence survey work in July 2006. 1.4.2 (T31): First annual Collection Area monitoring completed and written up by May 2007. 1.4.3 (T36): This is to be repeated annually *ad finitum*. 1.4.3 (T11): Biological survey team trained in survey techniques by HS July 2005, 2006 and 2007.	
2. Social and economic parameters of community determined and monitored, local knowledge and needs identified, and feedback loop established. [Increase livelihood opportunities from extraction of sustainable levels of ornamental fish lead to increased income for households in MSDR].	2.1 Households that have elected to be involved in the project benefit from an increased income of 10% due to the new fishery by 2008. 2.2 Two Community Associations have the organisational capacity to effectively manage and monitor a sustainable trade in ornamental fish in MSDR by May 2008.	2.1.1 (T5): Socioeconomic survey protocol agreed by September 05. 2.1.2 (T7): Communities and individuals to be involved in the project determined and agreed by December 2005. 2.1.3 (T14): Baseline socio-economic surveys of identified MSDM communities and fishers completed by May 2006. 2.1.4 (T21): Socio-economic monitoring protocol agreed by August 2006 that will include indicators to measure the socio-economic impact of the trade in ornamental fish on the communities. 2.2.1 (T12): Socio-economic survey team including community promoters trained in survey protocol by October 2005. 2.2.2 (T19): Results of the baseline socio-economic surveys presented to the communities by June 06. 2.2.3 (T22): Through a process of consultation, communities endorse Best Practice Guidelines[iii] by September 2006.	Willingness of community to participate in survey and embrace project principles. Sufficient information available to assess socio-economic parameters accurately.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
		2.2.4 (T26): Fishers trained in Best Practice Guidelines to be independently assessed as competent by May 2008. 2.2.5 (T24): Community organisations formed, officially registered and membership protocols agreed by September 2007. 2.2.6 (T25): Training of designated personnel from community associations in business management, accounting reporting etc. to ensure that they are verified as competent by May 2008.	
3. Market and economic potential for fishery identified, a business plan and standardised guidelines in place for trading procedure from source to end-user.	3.1 A sustainable trade in ornamental fish is established from the MSDR by May 2008. 3.2 Standardised Best Practice Guidelines are adopted by May 2008 for the sustainable trade in ornamental fish from MSDR that are transferable and can be applied in a wider Amazonian context.	3.1.1 (T1): Industry analysis undertaken on UK and European fish trade with particular reference to Brazilian ornamental fish. Report produced by December 2005. 3.1.2 (T9): Industry analysis undertaken on Brazilian fish trade with particular reference to fish exported from Manaus, Brazil, by December 2005 to include current trade pathways/systems. 3.1.3 (T10): Current and where possible future trade regulations identified by April 2006 to include taxes, custom requirements, health and welfare procedures in Brazil, UK, Europe, Japan and US. 3.1.4 (T15): Business plan drafted and reviewed by project team by June 2006 to include scenarios to advise selection of fish species list. T30: Business plan to be reviewed annually. 3.1.5 (T28): Implementation of ornamental fish business plan by May 2008. 3.2.1 (T2): Existing natural resource certification/guidelines are assessed and potential applicability determined by December 2005. 3.2.2 (T32) Produce and peer review standardised Best Practice Guidelines for the sustainable trade in ornamental fish. Draft by June 2006 and Final June 2007.	Communication between all links of trade chain and willingness to document trade movements. Standardised monitoring techniques maintained. Relevant stakeholders willing and able to participate in training. Continuity for trained staff and their willingness to disseminate training methods to others.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
		3.2.3 (T40): Peer review standardised Best Practice Guidelines are adopted by fishers, managers, communities, traders, exporters, importers and retailers by May 2008 3.2.4(T23): Procedures for trade documentation, verification of compliance to standards, auditing and feedback procedures developed and implemented by May 2008.	
4. Fish welfare maintained from source to end user	4.1 Ornamental fish welfare secured by achieving 80% reduced mortality alongteh supply chain from 2008.	4.1.1 (T42). Recommendations for improved welfare by May 2006. Water quality parameter standards within defined optimum values achieved on 90% of shipments by May 2008. 4.1.2 (T32) Best practice guidelines produced for animal welfare from capture to consumer by May 2007. 4.1.3 (T40) Communities, exporters and importers implementing Fish Welfare Best Practice guidelines by May 2008	Each component of the chain unwilling to implement best practice. Each component of chain requires training to implement best practise Upon understanding that welfare improvements will benefit their livelihood, communities and exporters will actively seek to implement changes and maintain best practise. Improvements can be made with realistic modifications to shipping methods. Improvements can be made that do not require extensive capital investment and that once capital investments are made, they will continue to provide benefit without significant re-investment.
Standards for sustainable harvesting upheld within reserve. [This is included in Outputs 1 and 3]			
Understanding of, support for, and participation in sustainable ornamental fishery within community. [This output is included in Output 2]			

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Activities Research and monitoring programme	**Activity Milestones (Summary of Project Implementation Timetable)** Within year 1: Undertake population survey of ornamental fish species. Socio-economic survey of local community. Collect information required for CAMP. Assessment on Brazilian and international trade and market perspectives. Within year 2: Establish monitoring system protocols for biological and socio-economic work. First biological monitoring survey and trial collection season. Produce working business plan. Within year 3: Put in place pilot system for evaluating and monitoring off-take and socio-economic indicators. Data organised, maintained and available in accessible forms. Fisher organisations with increased capacity to coordinate business and carry out practicalities of trade. Produce working guidelines for trade.		
Workshops, meetings and training	Within year 1: Hold introductory and information-gathering meetings. Biological and socio-economic methodology training. Community interviews. Brazilian trade analysis meetings and workshop. Methodology review and annual review meetings. Within year 2: Hold fishers meetings to discuss collection scheme planning. Hold community training on business, collection, handling and transportation techniques. Trade meetings to discuss business plan, CAMP and trade procedures. Refresher biological and socio-economic methodology training. Methodology review and annual review meetings. Within year 3: Hold fisher training sessions for business and collection procedures. Trade workshop to present and discuss CAMP and trade guidelines documents to stakeholders.		
Production of material	Within year 1: Biological survey report. Database. Semi-annual and annual report. Within year 2: Socio-economic survey report. Biological and socio-economic monitoring results and monitoring protocol reports. Stakeholder agreements. Drafted business plan and CAMP. Semi-annual and annual report. Within year 3: Guidelines for trade. Business plan and CAMP. Training manual. Summary of project. Semi-annual and final report.		

Annex 3 Project contribution to Articles under the CBD

Project Contribution to Articles under the Convention on Biological Diversity

Article No./Title	Project %	Article Description
6. General Measures for Conservation & Sustainable Use		Develop national strategies that integrate conservation and sustainable use.
7. Identification and Monitoring	20	Identify and monitor components of biological diversity, particularly those requiring urgent conservation; identify processes and activities that have adverse effects; maintain and organise relevant data.
8. In-situ Conservation	10	Establish systems of protected areas with guidelines for selection and management; regulate biological resources, promote protection of habitats; manage areas adjacent to protected areas; restore degraded ecosystems and recovery of threatened species; control risks associated with organisms modified by biotechnology; control spread of alien species; ensure compatibility between sustainable use of resources and their conservation; protect traditional lifestyles and knowledge on biological resources.
9. Ex-situ Conservation		Adopt ex-situ measures to conserve and research components of biological diversity, preferably in country of origin; facilitate recovery of threatened species; regulate and manage collection of biological resources.
10. Sustainable Use of Components of Biological Diversity	10	Integrate conservation and sustainable use in national decisions; protect sustainable customary uses; support local populations to implement remedial actions; encourage co-operation between governments and the private sector.
11. Incentive Measures	40	Establish economically and socially sound incentives to conserve and promote sustainable use of biological diversity.
12. Research and Training	15	Establish programmes for scientific and technical education in identification, conservation and sustainable use of biodiversity components; promote research contributing to the conservation and sustainable use of biological diversity, particularly in developing countries (in accordance with SBSTTA recommendations).
13. Public Education and Awareness	5	Promote understanding of the importance of measures to conserve biological diversity and propagate these measures through the media; cooperate with other states and organisations in developing awareness programmes.
14. Impact Assessment and Minimizing Adverse Impacts		Introduce EIAs of appropriate projects and allow public participation; take into account environmental consequences of policies; exchange information on impacts beyond State boundaries and work to reduce hazards; promote emergency responses to hazards; examine mechanisms for re-dress of international damage.
15. Access to Genetic Resources		Whilst governments control access to their genetic resources they should also facilitate access of environmentally sound uses on mutually agreed terms; scientific research based on a country's genetic resources should ensure sharing in a fair and equitable way of results and benefits.

Article No./Title	Project %	Article Description
16. Access to and Transfer of Technology		Countries shall ensure access to technologies relevant to conservation and sustainable use of biodiversity under fair and most favourable terms to the source countries (subject to patents and intellectual property rights) and ensure the private sector facilitates such assess and joint development of technologies.
17. Exchange of Information		Countries shall facilitate information exchange and repatriation including technical scientific and socio-economic research, information on training and surveying programmes and local knowledge
19. Bio-safety Protocol		Countries shall take legislative, administrative or policy measures to provide for the effective participation in biotechnological research activities and to ensure all practicable measures to promote and advance priority access on a fair and equitable basis, especially where they provide the genetic resources for such research.
Other Contribution		Smaller contributions (eg of 5%) or less should be summed and included here.
Total %	100%	Check % = total 100

Annex 4 Standard Measures

Code	Description	Totals (plus additional detail as required)
Training Measures		
1a	Number of people to submit PhD thesis	0 – two in progress (Brazilian students)
1b	Number of PhD qualifications obtained	0 - two in progress
2	Number of Masters qualifications obtained	Three – one socioeconomic and two biological. Further MSc may be attained in the future. All are Brazilian students.
3	Number of other qualifications obtained	High school training courses. Accreditation points given. Minimum of 40 Brazilian students.
4a	Number of undergraduate students receiving training	Minimum of 40 Brazilian students.
4b	Number of training weeks provided to undergraduate students	Minimum of 22 weeks
4c	Number of postgraduate students receiving training (not 1-3 above)	Minimum of 6
4d	Number of training weeks for postgraduate students	Minimum of 6 weeks
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification(ie not categories 1-4 above)	6 – including sociologist and researchers
6a	Number of people receiving other forms of short-term education/training (ie not categories 1-5 above)	Brazilian interns who stay for an academic year undertaking fish research - 6 Participatory training 64 min
6b	Number of training weeks not leading to formal qualification	101 training weeks in participatory methods – collection, husbandry and transportation skills
7	Number of types of training materials produced for use by host country(s)	3 – two training manuals (biological and social); 1 best practice manual
Research Measures		
8	Number of weeks spent by UK project staff on project work in host country(s)	27.6 weeks
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s)	3: - 1 complete Collection Area Management Plan (Amana) and 1 in draft (Mamiraua) 1 species management plan - arowana
10	Number of formal documents produced to assist work related to species identification,	1 within CAMP

Code	Description	Totals (plus additional detail as required)
	classification and recording.	
11a	Number of papers published or accepted for publication in peer reviewed journals	3
11b	Number of papers published or accepted for publication elsewhere	
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	1 tracking system for fish collected
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	1
13a	Number of species reference collections established and handed over to host country(s)	0
13b	Number of species reference collections enhanced and handed over to host country(s)	1
Dissemination Measures		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	Does this include community workshops to feedback information? If so, at least 12 organised
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/ disseminated.	28
15a	Number of national press releases or publicity articles in host country(s)	1
15b	Number of local press releases or publicity articles in host country(s)	1
15c	Number of national press releases or publicity articles in UK	2
15d	Number of local press releases or publicity articles in UK	0
16a	Number of issues of newsletters produced in the host country(s)	3
16b	Estimated circulation of each newsletter in the host country(s)	~ 500
16c	Estimated circulation of each newsletter in the UK	60,000
17a	Number of dissemination networks established	1 science/community network
17b	Number of dissemination networks enhanced or extended	0
18a	Number of national TV programmes/features in host country(s)	0
18b	Number of national TV programme/features in the UK	0
18c	Number of local TV programme/features in host	0

Code	Description	Totals (plus additional detail as required)
	country	
18d	Number of local TV programme features in the UK	0
19a	Number of national radio interviews/features in host country(s)	1
19b	Number of national radio interviews/features in the UK	1 recorded – not sure if it was broadcast
19c	Number of local radio interviews/features in host country (s)	1
19d	Number of local radio interviews/features in the UK	0
Physical Measures		
20	Estimated value (£s) of physical assets handed over to host country(s)	£21,000
21	Number of permanent educational/training/research facilities or organisation established	2 – integrated as sub-component of existing fishing association Amana and Mamiraua
22	Number of permanent field plots established	There are approx 12 long term monitoring sites where baseline surveys have been undertaken
23	Value of additional resources raised for project	£2,000 in the UK. Further funds in Brazil (undisclosed).
Other Measures used by the project and not currently including in DI standard measures		

Annex 5 Publications

Type * (eg journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £
Journal	**Mendonça, M. & M. Camargo** (2006). Etnoecologia da produção de peixes ornamentais num sector do médio rio Solimões, Flona Tefé e Reservas Mamirauá e Amanã - estado do Amazonas.	*UAKARI,* 2(1): 53-61.	http://www.mamiraua.org.br/uakari/home.htm Also available from other libraries but key ones are: Instituto de Desenvolvimento Sustentável Mamirauá (IDSM) Biblioteca Av. Brasil, n.197 - Caixa Postal 038 Bairro Juruá CEP 69470-000 Tefé, AM British Library Legal Deposit Office - The British Library Boston Spa, Wetherby West Yorkshire LS23 7BY, United Kingdom	Free
Project Information sheets	'Conserving ornamental fish in the Amazon.' Zoological Society of London, 2006. English and Portuguese ver	ZSL	www.zsl.org Conservation Programmes, ZSL, Regent's Park, London NW1 4RY	Free
Journal	**Barata, J. P. B. & H. Lazzarotto** (2008). Identificação das espécies de *Apistogramma* Regan (Cichlidae : Perciformes) da drenagem dos lagos Amanã e Urini (AM, Brasil) e chave para as espécies de ocorrência local.	*UAKARI,* 4(1): 7-22.	www.mamiraua.org	Free
Journal	**CHAVES, R.; M. CAMARGO & H.L QUEIROZ**. Estudos ecológicos do aruanã branco Osteoglossum	. In: Queiroz, H.L.; Camargo, M.. (Org.). Biologia, Conservação e Manejo dos		

	bicirrhosum em áreas inundáveis do Médio Rio Solimões	Aruanãs na Amazônia Brasileira. 1 ed. Tefé: IDSM, 2008, v. 1, p. 75-86.		
Journal	**SOUZA, P. R & H.L. QUEIROZ**. A participação do aruanã (*Osteoglossum bicirrhosum*) nos ilícitos registrados pelo sistema de fiscalização da Reserva Mamirauá.	In: Queiroz, H.L.; Camargo, M.. (Org.). Biologia, Conservação e Manejo dos Aruanãs na Amazônia Brasileira. 1 ed. Tefé: IDSM, 2008, v. 1, p. 41-60.		
Journal	**Costa, W.J.E.M. & H. Lazzarotto** (2008). *Rivulus amanan*, a new killifish from the Japurá river drainage, Amazonas river basin, Brazil (Cyprinodontiformes: Rivulidae).	*Ichthyological Exploration Freshwaters*, 19(2): 129-134.		
Journal	**Queiroz, H. L. & M. Camargo** (Orgs.). Biologia, Conservação e Manejo dos Aruanãs na Amazônia Brasileira.	1. ed. Tefé: IDSM, 2008. v. 1. 152 p.		
Journal	**QUEIROZ, H. L.**. Investimento Parental e Reprodução do Aruanã *Branco Osteoglossum bicirrhosum* na Reserva Mamirauá.	In: Queiroz, H.L.; Camargo, M.. (Org.). Biologia, Conservação e Manejo dos Aruanãs na Amazônia Brasileira. 1 ed. Tefé: IDSM, 2008, v. 1, p. 119-132.		
Journal	**Prang, G.** (2007). An industry analysis of the freshwater ornamental fishery with particular reference to supply of Brazilian freshwater ornamentals to the UK market.	*UAKARI,* 3(1): 7-51.	www.mamiraua.org	Free

Annex 6 Darwin Contacts

Ref No	14-060
Project Title	Sustainable Management of Ornamental Fish, Mamiraua
UK Leader Details	
Name	Alison Debney (nee Shaw)
Role within Darwin Project	Project Leader
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Email	
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Partner 1	
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Role within Darwin Project	Project Leader
Address	Sociadad Civil Mamiraua, Tefe, Amazonas
Fax	
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Partner 2 (if relevant)	
Name	
Organisation	
Role within Darwin Project	
Address	
Fax	
Email	

[i] Standardised guidelines are to include: ecosystem management which comprises the Collection Area Management Plan; collection methods, handling and storage; logistics and transportation from source to retailer which included husbandry and fish welfare; administrative and accounting procedures. To be defined further.
[ii] CAMP to include: geographical, ownership and political boundaries of collection area, identification of all stakeholders, collection and fishing history, species for collection, catch quotas, monitoring protocol to include reporting of destructive or over fishing practices or list of significant organisms not to be touched and procedures in place to prevent this.

[iii] Standardised guidelines are to include: ecosystem management which comprises the Collection Area Management Plan; collection methods, handling and storage; logistics and transportation from source to retailer which included husbandry and fish welfare; administrative and accounting procedures. To be defined further.