

# 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	15-013
Project Title	Biodiversity and sustainable development of butterfly production (Lepidoptera) in Guyana
Host country(ies)	UK and Guyana
UK Contract Holder Institution	University of Warwick
UK Partner Institution(s)	Natural History Museum, Royal Botanical Gardens at Kew, Matthews Payne & Bond LLP
Host Country Partner Institution(s)	Iwokrama Centre for Rain forest Conservation and Development, The University of Guyana
Darwin Grant Value	£322,993
Start/End dates of Project	July 1 <sup>st</sup> 2006 to June 30 <sup>th</sup> 2009
Project Leader Name	Dr Doreen Winstanley
Project Website	<a href="http://www.guyanabutterflies.com">www.guyanabutterflies.com</a>
Report Author(s) and date	Dr Doreen Winstanley, edited by H. Sambhu, G. Maharaj and Katharine Payne September 2 <sup>nd</sup> 2009

## 1 Project Background

This project built capacity to meet the CBD commitments for Guyana through documenting butterfly biodiversity and identifying their host plants, and developing the potential for sustainable livelihoods, in particular the potential for a butterfly farming initiative, in the target areas of the Iwokrama Rainforest Reserve and surrounding North Rupununi District. The project promoted sustainable non-forest timber initiatives in the area, and built capacity for Iwokrama International, the CSBD and University of Guyana. The socioeconomic aspects of the project encouraged direct community involvement in conservation and sustainable exploitation of resources. Knowledge of local butterflies has informed ecotourism, in the region

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

### 1. CBD Objectives (see Annex 3 for further details)

1. *To conserve biological diversity* – This study allowed for the first ever annual survey of butterflies in Guyana in the North Rupununi Region, which includes the Iwokrama International Centre for Rain Forest Conservation and Development Reserve, to be conducted. This provided the first baseline study. The survey is a valuable contribution in developing tools for ecosystem management within the region. In particular, it is already known that these ecosystem and indicator species assessments can be used to assess of the impact of logging within the region and developments associated with the opening of the Takatu bridge linking Guyana to Brazil.

2. *To use biological diversity in a sustainable fashion*-The annual butterfly survey database has provided information for butterfly species of commercial value to the butterfly pupae export trade that are prevalent in the habitat zones of the North Rupununi Region. The habitat zones namely; Forest, Forest/Savannah interface and Savannah are representative of the vegetation found in and around the communities of the North Rupununi. The project determined that

sustainable production of butterfly pupae would be possible in this region in communities which have reasonable access to the butterfly export hub at Fair View village. The butterfly export hub was established during this project and is the focal point and main butterfly export location within the Guyana.

Additionally, the set up of this hub has created a positive perception to alternative income generating opportunities within the local communities and has instilled a culture of sustainable development

*3. To share the benefits of biological diversity fairly and equitably* — Work through this project encouraged and helped the development of a sustainable butterfly business within the region. This business is run by the local communities, for the local communities. The North Rupununi District Development Board (NRDDB), a local organisation tasked to manage the administrative and business aspects of the region and chaired and managed by the local community, will head the development of the community based butterfly business. They will be supported by the World Wildlife Fund (WWF) and Iwokrama. Due to high level of NRDDB involvement it is envisaged, that this future business will benefit all communities of the North Rupununi.

## **2. 2010 biodiversity target**

*The 2010 target is to achieve a significant reduction in 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.*

The importance of identifying butterfly host plants in maintaining butterfly biodiversity in the region has emerged from this project. Many trees, common vines, weeds and grasses have been identified as important butterfly host plants in this study. Sustainable targeted logging in the Iwokrama forest may have a negative impact on butterfly populations, since some trees selected for logging are butterfly host plants for valuable butterfly species. If this is the case, it is thought that sustainable targeted logging may have a negative effect on other species, although this cannot be confirmed without further study. However, this project has highlighted that butterfly populations should be considered and biodiversity monitored to avoid the possible decline in their biodiversity, especially if initiatives aimed at alleviating poverty are to be sustainable.

*Sharing of resources* - This project has generated a significant study collection of butterflies from Guyana. Most butterflies on the project database have been tentatively classified to family and sub-family and half to genus by the MSc student (Ms Gyanpriya Maharaj, GM), using a collection of reference books donated by the project. The butterfly specimens are held in country, at the Centre for Studying Biodiversity (CSBD) on the University of Guyana (UG) Turkeyen Campus and are cross-referenced to digital images and accession numbers on an electronic database. CSBD will archive replicate specimens from this butterfly collection at the Natural History Museum (NHM) in the UK. The electronic database will also be made available on the project website and can be obtained from the CSBD at UG. A comprehensive collection of butterfly reference books purchased by the project will be available to UG and visiting researchers at the CSBD.

*Increase in capacity*- The partnership between the above organisations, via this project, has helped host country institutions increase their capacity in scientific knowledge and expertise. One of the MSc students (GM) on the project is now employed in the CSBD and is willing to help in any butterfly identification post-project. She submitted her MSc to the University of Warwick in June 2009 and was responsible for processing and recording in a database most of the butterfly specimens from the survey. Identification of every specimen is an ongoing process. The identification of 95 butterfly species was confirmed by the NHM and these formed the basis of the handbook. Another member of the CSBD (Ms Kaslyn Holder, KH) also received 9 months training in butterfly surveying techniques. An MSc student based at Iwokrama developed expertise in butterfly farming and business development and will continue to support the community butterfly business post-project. Four Amerindians received comprehensive training in butterfly surveying and farming and have the knowledge base to help underpin butterfly farming in the communities. An additional four community members interested in satellite farming received training. The expertise generated from this project will contribute

towards enhancing income generating opportunities and ecosystem services and ecotourism within the region. Sustaining and expanding this capacity will be dependent on: 1. Continuing support from the Iwokrama International Centre for Rain Forest Conservation and Development (Iwokrama); 2. Continuing expert support post-project; 3. Funding to retain the Amerindian staff based at the butterfly farm and 4. The ability of the CSBD to retain their qualified staff.

The project interacted closely with three staff members at the CSBD (GM, KH), Mr Calvin Bernard (CB, Director of the CSBD). Materials, specialist butterfly books and cabinet drawers were donated by the project to the CSBD. Gyanpriya Maharaj received expert advice from Ms Blanca Huertas (BH) during two visits to the NHM. Gwilym Lewis (expert in the Leguminosae) from Kew Gardens Herbarium delivered training to the two MSc students at Kew and offered his services on plant identification.

The project concentrated on supporting the CSBD and consequently did not support other biodiversity conventions

### **3 Project Partnerships**

Over the life time of the project numerous partnerships were developed between different organisations. These collaborations will continue to develop in the future and will support the new butterfly farming business. The relationship with each of the project partners is detailed below.

#### **The Iwokrama International Centre for Rain Forest Conservation and Development**

(Iwokrama): The project was initiated by the University of Warwick (UW) and Iwokrama. The proposed project was compatible with the Iwokrama mandate to promote the sustainable exploitation of forest resources to create alternative livelihoods for the forest communities. Iwokrama had a lead role in the organisation and management of the project in Guyana. Both Iwokrama and our consultant Katharine Payne provided advice and assistance in developing the proposal. Iwokrama was central in delivering the project outputs in the host country. Dr Raquel Thomas (RT) was the in-country co-ordinator but we also received support and assistance from Dr David Singh (former Chief Executive of Iwokrama) and Mr Dane Gobin (DG) (current Chief Executive of Iwokrama). Dane Gobin administered the in-country part of the Darwin budget on behalf of the NRDDDB, Iwokrama and the University of Guyana. In addition, Iwokrama organised transport and accommodation, for the project team, including the UK team members; as well as most of the consumables and equipment needed throughout the project. Over the time of the project an excellent working relationship developed between the University of Warwick and Iwokrama and there was regular communication between the UK project leader (Doreen Winstanley, DW) and the finance department of the University of Warwick (UW) and DG in Iwokrama. Mr H. Sambhu (HS), from Iwokrama, managed the project outputs and budget at the team level on a daily basis and Ms Samantha James (SJ), the outreach officer for the North Rupununi, also from Iwokrama, promoted the butterfly project within the communities by educating the young people (children aged between 8 to 17 years) about butterflies, butterfly farming and sustainable income generating alternatives to logging and fishing through Wildlife club activities.

#### **The University of Guyana (UG)**

Close working partnerships evolved with other organisations during the project. It was initially intended for the project MSc students to be registered at UG, however, prior to the commencement of the project it was seen to be more valuable, realistic and beneficial for the students to be registered at the University of Warwick (UW) due to UG being mainly focused on undergraduate teaching and not having the same facilities and training opportunities as the UW for postgraduate students. The original UG based MSc student (KH) left the project after 9 months and UG was able to assist in appointing a replacement student (GM). Relatively little disruption occurred to the project mostly because the replacement student and the team worked hard to deliver the relevant output. The CSBD at UG made available their pre-existing reference collections of Lepidoptera for the study. The new collection of butterfly species resulting from the one year survey carried out in this project was deposited at the CSBD and is now part of their reference collection. The CSBD will make available nationally and

internationally the database of species generated from this project. CSBD's Herbarium, assisted throughout the project in identifying some of the butterfly host plants and specimens of host plants have been deposited at the CSBD. Copies of the two MSc theses, reports and publications will be deposited in the University's library and on the project website, and access will be provided to researchers worldwide. GM and KH (the previous MSc student) are now employed at the CSBD and their knowledge will be available to scientists.

The project also had regular contact with Mr Calvin Bernard (CB), co-manager of the CSBD. Over the three year period the partnership between UG and the UW strengthened and gained momentum, particularly since two of the MSc students were UG staff members. There is a desire by the new Vice Chancellor Professor Lawrence Carrington (originally from the University of the West Indies), who has had previous links with UW, to establish future research collaborations between UG, Iwokrama and UW. This project has also assisted in forging links internally in-country between Iwokrama and CSBD/UG staff with the benefit of these collaborations being long-term partnerships.

#### *Partnerships with other UK or Regional partners*

Mr Neil Naish (NN) left UW to join an Oxford based company, in October 2007. Subsequently, he has been appointed as a consultant on the project so that he could continue to instruct and advise the team on butterfly identification and farming. NN has first-hand knowledge of the tropical butterfly and moth market and in butterfly production. NN's expertise should help to ensure the success of the butterfly production initiative and marketing.

In March 2008 the two MSc students visited the UK, which provided an opportunity to visit Dr Gwilym Lewis (GL), an expert in tropical *Leguminosae*, at the **Herbarium at Kew**. High value butterflies present in Guyana e.g. *Morpho* species are known to have leguminous host plants and GL was very enthusiastic about the project and offered to identify free of charge any the leguminous host plants of butterflies of interest. GL demonstrated specimen preparation techniques to those involved in the project and presented both MSc students with a new book entitled "Legumes of the World" by Gwilym Lewis, Brian Schrire, Barbara Mackinder and Mike Lock. This book is now housed within the libraries of Iwokrama and CSDB. Kew's other resident experts were also available to offer support and assistance e.g. expertise on the *Passiflora*, which are common host plants for other butterflies of interest in this project i.e. *Heliconius sp.*

The students also visited **the Entomological Library of the Natural History Museum** at Wandsworth. They met Ms Blanca Huertas who is currently involved in the Tropical Andean Butterfly Diversity Project ([www.andeanbutterflies.org](http://www.andeanbutterflies.org)), another South American butterfly survey, in which Darwin has some involvement. She offered valuable information and advice to GM and later confirmed the identification of some of the butterflies from the Guyanese collection.

During the project the MSc students and UK team visited **the Stratford upon Avon Butterfly Farm**, where they met Mr Richard Lamb and had first hand discussions with a UK importer of butterfly pupae and other live insects, as well as the opportunity to see the type of establishment in which Guyanese pupae may be displayed in UK, Europe or USA. The Stratford Farm already trade in butterflies from South America gave advice on species of interest to them. They were supportive of the project and have allowed BBC TV to use the centre as a backdrop for a report on the Darwin project and an icast broadcast.

**The University of Warwick** (UW) has expertise in insect pathology and provided fundamental advice and training on the pests and diseases of caterpillars.

The Warwick HRI, a Department of UW, was extremely supportive throughout the project; Warwick HRI paid the external registration fees for the MSc students in the project team who were seconded from both Iwokrama and the University of Guyana (UG). During the project two of the MSc students visited the University of Warwick and gave a presentation. All University services were made available to the MSc students, secretarial support, the services of the

biometricians and access to online journals. The MSc students visited Warwick HRI where they met with their MSc Advisory Committee and supervisor and presented posters at the annual post-graduate symposium.

Scientists at Warwick HRI are leading and members of several research consortia for projects associated with biodiversity and the environment, most of which have been funded by Defra. These projects are building capacity at UW and have allowed effective partnerships between national and international organisations to form.

#### *Other Stakeholders*

**The North Rupununi District Development Board (NRDDB)** is a community based organisation composed of village leaders (Toshao) and community representatives; currently, Sydney Allicock is the acting Chairman. The NRDDB has changed composition twice since the inception of this project and elections are due in August or October 2009. Routine updates of the butterfly project were presented by HS at the quarterly NRDDB board meetings over the term of the project and the NRDDB will continue to be involved and gain future updates of the butterfly initiative from the local community teams. The UK partners met the NRDDB executive in February 2009 to present the financial forecast for the butterfly hub; board members were impressed by the achievements of the butterfly hub and promised support for the future. Additionally, at the final meeting in June 2009 the acting NRDDB Executive, Virgil Harding, officially expressed real commitment in taking responsibility for promoting and developing a butterfly based community business. There is very little business expertise within the NRDDB or within the communities, therefore in 2009, with support from Iwokrama an experienced business manager (Michael James) was appointed by the NRDDB to help support sustainable business ventures, such as the butterfly farming initiative, and ensure fair and equitable benefit for the 16 communities, within the region.

**Environmental Protection Agency (EPA):** Advice was gained from the EPA and it was kept informed throughout the project. As a requirement EPA was sent the six monthly and annual reports of the project. The UK team, together with members of the host country team (HS, KS / GM) visited the EPA on each visit to Guyana and on occasions HS and GM delivered formal presentations to detail project progress. A close working relationship was established and the EPA granted an Experimental Collection Permit for the project. Our most recent contact was Mr Oumardatt Ramcharran.

**The Wildlife Division (WD):** The project team built up a strong working relationship with the WD over the term of the project. The UK team visited the Wildlife Division on every visit to Guyana so that Ms Alona Sankar (CEO) could guide the team through the steps necessary to be able to export butterflies to the UK and Europe. To date the project team has taken steps to obtain two licences for the village of Fair View so that the butterfly hub, located in the village can act as a holding station for pupae and has the right to commercially, but sustainably exploit the butterfly populations harvested from the purpose built butterfly farms. The holding station license (Appendix I) cost is \$GY 50,000 and the commercial exploitation licence cost is \$GY50,000. Fair View village paid for the licences and will receive a share of any profit from the sale of pupae. This represents a great deal of money to Fair View and is a leap of faith on their part. The licenses were issued following a satisfactory inspection of the completed butterfly farm / house by Ms Sankar of the WD. These licences have to be renewed annually. An export permit will be required for each shipment of butterflies which will cost 20% of the value of the shipment plus a 1.5% customs and excise fee. This is payable in advance (The WD apply the same fixed value for each pupa regardless of species). The cost of the export permit is based on the total number of pupae in each shipment. The good working relationship built trust between the project team and the WD and consequently the WD allowed for free test shipments of pupae during the term of the project. A standardised export procedure agreeable to both the butterfly hub and the WD has now been established; each batch of pupae will be inspected by the WD and Customs and Excise prior to shipment. A staff member from Iwokrama, HS in the first instance, will act as the agent in Georgetown to dispatch the pupae (Appendix II) sent in from the butterfly hub and will manage the export process.

**Customs and Excise Services (C&E):** A recent working relationship with C&E has been established. It is aimed that this relationship will strengthen in future as exports increase and the butterfly export business expands. To date, the Iwokrama agent liaises with C&E on behalf of the butterfly hub and signs all C&E paperwork to verify quantity and value of the pupae when shipments are made. NN liaises with C&E in the UK.

**Narcotics Unit (CANU):** Linked to C&E the CANU is important in the export process and have been made aware of the fragility of the pupa shipments if they have occasion to inspect the shipments.

**Fair View:** Fair View village have been integral to this success of this project and have been supportive at all stages. The village donated land for the construction of a butterfly centre/hub. At the start of this project a Memorandum of Cooperation (Appendix IIIa and IIIb) was signed between Iwokrama and Fair View village to allow the use of their land for butterfly research. This has subsequently been expanded to cover the expansion of the project into a sustainable butterfly farming initiative which will benefit Fair View and all 16 communities. HS and the project team have regular meetings with the Toshao of Fair View (Bradford Allicock, BA) and the village council to update them on progress. The Toshao makes regular visits to the farm. Villagers within Fair View were involved in clearing the allocated and in providing timber and some of the labour to construct the butterfly house. Unfortunately during the life time of the project Fair View members became involved in a new sustainable logging and gold mining initiative within the region. As a result fewer members than expected became involved in butterfly farm and hub work. However, all of the community members of the project team (from different communities) at the farm are dedicated, hardworking individuals who will support, as well as benefit from, the project in the short and long-term future. At the end of the project Fair View paid for the Holding and Export Licences and will therefore play an important role in the future development of the business.

#### *Other Collaborations*

**Darwin Initiative Wetland Project:** In Guyana, the project team made contact with Dr Andrea Beradi and his family from the Wetland project covering the North Rupununi District. The outputs of the butterfly project will support the ecotourism aspect of their project and both projects have been able to gain mutual benefit e.g. by sharing information and resources such as the vehicle purchased by this Darwin Project.

**Society for Sustainable Operational Strategies (S-SOS).** As a result of a public presentation on the butterfly project in Guyana the project team made contact with S-SOS, an organisation of ex-NGOs and of business individuals, led by Jerry La Gra, whose aim is to offer their expertise and services to ensure the sustainability of community businesses. This organisation may be valuable in offering business training and support to the Amerindian members of the team who will develop the business. Jerry La Gra has already been very helpful in sharing his experiences and has offered his services in the future.

**The Convention on Biological Diversity (CBD) focal point:** The CBD focal point in Guyana is Dr Roger Luncheon, Head of Presidential Secretariat based in Georgetown. To date the project team has not made direct contact with Dr Luncheon but the department has gained routine updates via the EPA (see above for EPA links).

**The British High Commission in Guyana:** The relationship with the British High Commission (BHC) has been extremely positive and successful, being involved and very supportive from the start of the project. Regular meetings took place between the project team and High Commission each time the UK visited Guyana. This resulted in the BHC giving financial support for development of the butterfly production and ecotourism at the butterfly farm (named Kawe Amazonica). Recently, they offered to “launch” the butterfly handbook and rearing manual in Guyana. During the term of the project the BHC visited the butterfly farm in Fair View and was impressed.

**Conservation International (CI):** CI supported the project and offered financial support, along with Iwokrama and the Darwin Initiative, for one MSc student (GM) to travel to the UK to attend the Darwin Scholar Workshop in the UK.

**Lessons strengths and challenges:** There are many lessons which can be learnt from this project, the main one of which is the importance of establishing trust, honesty and building relationships with the local populations: The project benefited by HS's previous community involvement, which allowed for the project to achieve many of its goals and milestones within the allocated time of the project. HS had previously been a member of the DI Wetland project in the North Rupununi and was a familiar and friendly face in the communities of the North Rupununi; this proved to be extremely valuable. Additionally, the already established good working community relationships with Iwokrama in community and livelihood development in the North Rupununi via their Outreach Programme (SJ), the Ranger training programme, establishment of the NRDDDB and in developing the sustainable timber concessions with the communities in the Iwokrama Forest Reserve (Raquel Thomas, RT) and Tiger Woods Inc were essential. Further good relations developed with the partners during the project, facilitated by the members of the team who represented each partner (Iwokrama, CSBD, NRDDDB, and the communities) and without these it would have been difficult to steer and manage the project remotely from the UK.

The project team adopted a successful strategy in developing a model for the export of butterfly pupae from Guyana, as a result of regular visits to EPA and the Wildlife Division to build up good working relationships.

One of the challenges of the project was the amount of NRDDDB involvement during the project. Initially, the NRDDDB took responsibility for advertising community vacancies for the project and appointing two community members to the team. Unfortunately, the NRDDDB Executive Committee changed twice from the inception of the project until its conclusion and a new Executive will be elected in August or October 2009. Therefore, community involvement in the early stages of the project was generated through Iwokrama rather than the NRDDDB. However, it was understood that the butterfly farming concept was new and outside their experience, thus with more support and education for the NRDDDB in the early few months their involvement could have been increased.

To date Neil Naish (NN), originally from UW, has helped to develop a market for the butterfly pupae and has acted as the importer for the test shipments of butterflies. Business training has been given to a few local individuals; however further training as well as learning through experience will be required in the future to allow the communities to run this business independently.

Iwokrama is encouraging NRDDDB and communities to develop skills and know-how to meet the challenges from the rapidly changing pressures on the communities of the North Rupununi, whilst maintaining biodiversity. As a result Iwokrama were willing to lend financial support and business expertise to benefit the development of a butterfly livelihood when the project ends. Bradford Allicock, the Toshao for Fair View, was important in the establishment of a Memorandum of Cooperation between the Fair View community and Iwokrama, on behalf of the project, whereby Fair View donated land specifically for the development of a butterfly farm, for the long term benefit of the 16 communities from the North Rupununi. Good relations were developed between Bradford and the project team and fortunately, he has been reappointed as Toshao of Fair View for a further 3 years. The Memorandum is due for renewal in the near future and this is already being addressed. We foresee no problems regarding renewal.

## 4 Project Achievements

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

The aim of the project was to enhance the biodiversity-based contribution to sustainable livelihoods in the North Rupununi region of Guyana.

This project was not designed to bring a direct and measurable change in butterfly biodiversity during the lifetime of the project or to set up a new livelihood based on the sustainable utilization of butterfly biodiversity. It provided tools and resources to monitor butterfly biodiversity and to examine the feasibility for community livelihoods based on butterflies. A bonus was the establishment of the infrastructure for livelihoods based on the export of butterfly pupae and the display of butterflies as an ecotourism resource.

The main achievements were:

1. Training workshops were delivered to the butterfly team on biodiversity monitoring and butterfly farming. Training was also delivered potential satellite farmers.
2. The first complete one year butterfly biodiversity survey, representing the three habitat zones found in the North Rupununi region. This will act as the foundation for a future more robust baseline study of butterfly biodiversity in the region, which will probably require data from two annual surveys.
3. A new invaluable reference collection of butterflies was established and is housed at the CSBD together with an electronic database cross-referenced to digital images of the specimens. These will be valuable research resources.
4. There is increased awareness of butterfly biodiversity and capacity (both at the local and Institutional level) to monitor and identify butterflies, which should have a positive impact on the conservation of butterfly biodiversity, as well as their host plants. There was no butterfly expertise at the CSBD or Iwokrama at the start of this project.
5. Dissemination of butterfly biodiversity knowledge to all communities using the butterfly handbook.
6. Increased awareness of butterfly diversity among communities of the North Rupununi and an appreciation that familiar local plants, including trees, are host plants for butterflies. At the inception of the project there was very limited appreciation of butterfly biodiversity amongst the communities; in most communities butterflies were regarded as “wallpaper”, had spiritual significance and/or were used as indicators of changing weather.
7. Increased awareness of butterfly biodiversity via the community wildlife clubs. These were organised by the Iwokrama outreach officer SJ. The butterfly team was involved in the wildlife club activities e.g. the wildlife club festival and involvement in butterfly monitoring activities.
8. The infrastructure for a community livelihood based on the sustainable production of butterfly pupae is in place together with butterfly rearing protocols, a business plan, financial forecasts and export procedures.
9. A butterfly farm “Kawe Amazonica” was created in co-operation with the Fair View community and will act as the export point for pupae in the community based business as well as a training centre and an ecotourism attraction.
10. An assessment was made to determine the feasibility for a sustainable community based butterfly business in the North Rupununi based on the butterfly biodiversity survey, a socioeconomic survey and the ability of local community members to farm



butterflies. It was found that it is feasible but continued expert training is required to ensure the sustainability of the business.

11. Increased collaboration between Iwokrama, CSBD and the University of Guyana which will form the basis for future joint biodiversity studies.

#### **4.2 Outcomes: achievement of the project purpose and outcomes**

The project achieved its purpose, as stated in the project proposal. The outcomes were an increased knowledge and capacity in butterfly biodiversity and the basis for developing a community butterfly business in the North Rupununi region.

The outcomes included an increase in butterfly knowledge at the community and Institutional level, via monitoring activities, a new reference collection of butterfly specimens and a comprehensive electronic database of the butterflies collected over a 12 month period that provided first baseline for butterfly biodiversity in the region. A handbook of representative samples (Appendix IV) from the survey was published and distributed to educate communities in butterfly biodiversity and to support potential butterfly farmers. The butterfly biodiversity study revealed the presence of many species of commercially valuable butterflies in the North Rupununi Region; and the host plants and life cycles for 19 of these species were determined. Initially, a butterfly training and production centre (Kawe Amazonica) at Fair View was established, which developed the protocols for rearing the 19 species. These were published in a training manual (Appendix V).

The strategy of individuals or community representatives bringing pupae produced *in situ* to a small collection centre was not practicable in this region and it was necessary to first establish a butterfly centre of expertise as the base, "hub", from which community satellite farmers would be educated and supported. The trained nucleus of staff at the centre will form part of the legacy for the project. There was no previous history of exporting butterfly pupae out of Guyana and over the 3 year project period it was necessary to work with the Wildlife Division to put export procedures in place. The butterfly farm at Fair View was appointed as the Holding Station and Fair View as the Export Licence holder. The export route from Guyana to the UK was developed and tested by successfully despatching several test shipments of pupae to the UK. A satisfactory protocol for shipping pupae was established but problems still exist in sending out pupae of the correct age; these are being addressed. Methods were developed for producing large numbers of synchronous pupae (of the same age) using finishing cages and flight cages and large host plant gardens. These techniques are being disseminated to the communities. However, on the farm plants such as the "batwing" *Passiflora vespertillo* proved to be the host plant for several of the farmable species and its successful year round propagation became rate limiting for the large scale production of these species, since it did not thrive well in the conditions in the gardens. Experiments and observations are being carried out to optimise the conditions for healthy growth of this important host plant. The farming methods were disseminated to four communities via community demonstrations and a workshop. It was possible to remain in regular contact with the communities near the butterfly survey sites but the more distant communities received updates from their Toshao, via the project updates we presented to the NRDDDB quarterly meetings. To date no pupae are being produced by satellite farms, but one community has established host plant gardens and has set up flight and finishing cages to rear butterflies. Pupae produced by this satellite will be exported from the central farm (hub).

Towards the end of the project, the Bina Hill Institute, which provides residential training for children aged 8-17 yrs within the North Rupununi, expressed interest in setting up a satellite farm. This was strongly supported by the NRDDDB whose offices are based at Bina Hill. It will be an excellent opportunity to disseminate butterfly knowledge and develop business skills to more communities in the region via their students, using the satellite farm as another training facility and generating income for the school.

The legacy for the butterfly farming activities has been secured for an additional year, since Iwokrama has agreed to pay the salaries and accommodation for the Amerindian members from the original project team until September 2009 and continued funding has been promised by Iwokrama, NRDDDB and WWF (US\$35,000) for a further year, to establish the business and increase dissemination. The richness of butterfly biodiversity in the North Rupununi together

with the production methods and facilities we developed have the potential to provide and supplement livelihoods in the North Rupununi but continued expert help from Guyana and the UK to build business skills and underpin the science. Additional funding will be required. Kipepeo has received external funding for 15 years. This project has made enormous progress from a standing start in just 3 years using more sophisticated methodologies.

The awareness of butterfly biodiversity was raised in the 16 communities to a greater or lesser extent through training, village meetings, survey interviews, NRDDDB meetings and local public relations activities. In the first 18 months the team also visited all 16 communities to introduce the project and determine their interest in butterfly farming, using a pre-prepared survey that was read out to each interviewee and their comments recorded. The expectations and “wait and see” approach of the NRDDDB and communities put pressure on the Amerindian team to demonstrate evidence of the potential for a butterfly livelihood. However, community members and officials (including the Prime Minister and British High Commissioner to Guyana) have all been very impressed on their visits to the butterfly farm and slowly confidence is building. This project made enormous progress from a standing start in just 3 years using more sophisticated methodologies than originally envisaged, which should lead to a viable International business.

One MSc student had submitted her MSc and is awaiting results and one will submit his MSc in October 2009.

### **4.3 Outputs (and activities)**

Most of the project outputs were achieved as shown in the logical framework. The outputs were sequential and interdependent and were delivered mostly in the final year of the project. Continuous training occurred throughout the lifetime of the project. A core team of six in the host country was responsible mostly for delivering the outputs, which initially involved monthly butterfly surveys in eight transects covering different habitat zones. Equipment necessary for the surveys was made locally copying samples sourced from the UK. It took some time to produce sufficient traps and butterfly nets. A complete one year biodiversity survey using baited traps was preceded by a six month survey using hand nets without baited traps. Different degrees of skill in using hand nets and an inability to catch fast or high flying butterflies compromised the quality of the survey using nets alone. Data from fruit baited traps is less subject to human proficiency and this method together with hand netting and direct observation were used in the assessment of the seasonality and abundance of fruit feeding butterflies. The butterfly biodiversity and socioeconomic surveys lasted two weeks per month and ran for a period of 18 months in all weather conditions. The butterfly surveys generated a large volume of data and the specimens collected from the butterfly surveys required processing and partial identification, ideally before the next monthly survey. This was very demanding on resources. Socioeconomic surveys for 16 geographically dispersed communities were also carried out, with one or more communities being visited per month. The butterfly farming activity had hardly started after eighteen months. Time had been required to: 1. Promote the project through community meetings; 2. To acquire land for the farm; 3. Determine farmable butterfly species and their host plants from the surveys; 4. Plant host plant gardens; 6. Develop the technical protocols and the infrastructure to farm and 7. Develop export procedures for butterfly pupae. The practical farming activities were condensed into the last 12 to 18 months of the project but were successfully achieved. In a period of 6 weeks from March 11<sup>th</sup> to May 25<sup>th</sup> 2009, test batches of pupae (2377 in total) with a minimum value of £1485.65 were sent to the UK. If the pupae had arrived in good condition the minimum payment after deduction of shipping, and customs and excise fees (on this occasion excluding Wildlife fees) would have been £1097.35. This represents relative small scale production for a butterfly farm with the potential of Kawe Amazonica. Methods are now being developed to keep the pupae in a better condition during their transit from the farm to the courier in Georgetown.

Recently, problems were encountered on the farm due lack of continuous labour, which exacerbated ongoing problems of pests and diseases, particularly inside the large netted butterfly house and most of the nectar and shade plants were destroyed by whiteflies, sucking bugs or moth caterpillars. In the host plant gardens pest such as spiders, army ants and other predators as well as sucking bugs and plant diseases were problems. The farm is now recovering and the export of butterfly pupae is resuming. Job descriptions and responsibilities were reassigned to the farm team, which seem to be working well. Frequent visits by the UK

team helped to resolve problems as they arose but expert help will be required for a few years after this project ends. This project was scientifically and technically challenging for the local in-country team but they learnt quickly. Normal local farming practices do not require daily care e.g. for cassava but butterfly farming is very different. An important lesson has been learnt by the local team, namely that the central farm requires daily attention from a minimum number of staff and any reduction in effort over a just a short period of time will lead to outbreaks of pests and diseases and the business will collapse. The “hub” underpins the community livelihood initiative. This should not be such a problem for a satellite farm since it will be based within the farmers own community. The results from the project socioeconomic survey were used to help determine the feasibility for a butterfly livelihood from a community view point. The feasibility assessment used data collected from previous published reports; the current project socioeconomic survey, community meetings at the individual and community level and meetings with NRDDDB, the Minister of Amerindian Affairs, EPA and WD held throughout the life time of the project. Financial success at the central butterfly farm will encourage uptake by satellite farmers. Ironically it is the satellite farmers that will secure the sustainability of the butterfly business.

By the end of the project most of the outputs had been delivered by a relatively small team. One MSc student submitted her MSc and is awaiting results and one will submit his MSc in October 2009.

#### 4.4 Project standard measures and publications

A list of standard measures is provided in Annex 5. There is sufficient data to publish papers on butterfly ecology in the North Rupununi (GM) and on the effect of host plant type and quality on the development time of butterfly pupae (HS). Until recently the main focus of the students was writing up their MSc theses, the preparation of the scientific papers for peer review journals will follow soon. The butterfly handbook is in great demand in Guyana by tourist organisations and interested visitors. An inexpensive publisher will be found so that the books are affordable in Guyana. Currently, the high quality books are printed on water resistant paper in the UK. A cheaper version is required that is affordable in Guyana. Proceeds from the books will benefit the butterfly livelihood.

#### 4.5 Technical and Scientific achievements and co-operation

Achievements were made with a relatively small team; the project benefited from having co-operative and experienced team members with complimentary knowledge and expertise. One member from Iwokrama had previous experience in biodiversity monitoring and socioeconomic surveys resulting from participation in a previous DI project in the same target area; this was extremely valuable. The community members of the team (two Iwokrama rangers and two NRDDDB appointed community members) had a wide range of skills and local knowledge. They worked extremely hard on the surveys, developing the butterfly centre and in community outreach activities. They learnt a lot from the scientific experts on the project and paid a working visit to the CSBD in Georgetown. In turn the rest of the team learnt techniques and gained local knowledge from the community members. Several team members acquired management skills throughout the project. Examples of technical and scientific co-operation are shown in the table below. Reports and outputs were copied to the various partners and collaborators for feedback. No research papers have been published in peer review journals to date but these are planned. Collaborations between Iwokrama, UG and the CSBD were enhanced through this project.

#### Summary of scientific research and technical co-operation

Topic	Approach	Sample	Researchers
Project Implementation	Meeting with partners involved in project and implementation workshop	Budget administration in country organised, Permit for research from EPA, use of facilities and staffing organised.	DS, DG, RT, DW, NN, HS
Butterfly Biodiversity survey	Monthly survey of transects in different habitat zones for 12	Hand netting, baited traps and visual recording	GM, HS, KH, DD, AJ, VJ, RR, MD, AJ, NN, DW

	months	Protocols for monitoring butterflies developed	KH, NN, GM, HS
Identification handbook for survey sites	Butterfly specimens from butterfly survey, set, photographed and half identified to genus level	Handbook of 95 species produced with images for each species	GM, NN, HS, DW, DD, VJ, AJ, RR.
Socioeconomic survey	Visits to 16 communities over a period of 18 months. Face-to-face Questionnaire and discussions	Questionnaire to determine knowledge of butterflies and potential interest in a butterfly livelihood	HS, KH, DD, AJ, VJ, RR
	Outreach activities with Iwokrama	Radio Paiwiomak broadcasts	VH, DD, AJ, VJ, RR
		Wildlife Festivals	SJ, DD, AJ, VJ, RR
		Butterfly monitoring and other club activities	SJ, VJ, AJ, RR, DD
		Socioeconomic report	HS
Developing protocols for butterfly farming	Determine host plants for selected butterflies	Observation of oviposition of butterflies to determine host plants	NN, HS, DD, VJ, AJ, RR
		Identification of host plants	NN, HS, KH, GM
Develop butterfly farm	Establish host plant garden	Protocols for propagation of host plants	NN, HS, DD, AJ, VJ, RR
	Build a butterfly house on farm	Organise stages in building the house and liaise with builders	HS, BA, the builders
	Materials for house frame	Fair View to provide timber	HS, BA
	Rearing butterflies	Life cycle stages determined for each species and protocols developed for rearing	HS, NN, DD, AJ, VJ, RR
	Protocols for butterfly farming developed	Manual for rearing butterflies produced	NN, HS, DD, AJ, VJ, RR, DW
	Ecotourism aspect developed	Farm tours developed	HS, DD, VJ, AJ, RR
		Butterfly ID sheet produced for farm	GM, DW, NN, HS, DD, AJ, VJ, RR
Shop/office built	RR, AJ, DD, HS & builders		
Develop business plan	Workshop for team and business training course for one team member and input from professionals	Business plan produced	DG, NN, HS, DD, RR, AJ & VJ
Export route developed and tested	Work with the WD, bus company, Couriers, Customs and Excise in Guyana and UK	Export permits, and transport route tested	HS, NN
Butterfly biodiversity in relation to seasonality, altitude, rainfall, and phenology	Use of survey data and to determine the relationship between butterfly abundance and richness to the parameters selected	MSc submitted by GM	GM
<b>Key to personnel:</b> GM= Gyanpriya Maharaj, HS= Hemchandranauth Sambhu, KH= Kaslyn Holder, DD= Delano Davis, AJ= Arnold Jacobus, VJ= Verley Jacobus, RR= Ryan Roberts, NN= Neil Naish, DW= Doreen Winstanley, SJ= Samantha James, BA= Bradford Allicock, MD= Micah Davis, DG= Dane Gobin			

#### **4.6 Capacity building**

Butterfly biodiversity and farming capacity has increased significantly, both in the communities and institutions within Guyana; at the people, organisational and infrastructure levels. All members of the team took part in the butterfly biodiversity studies, have knowledge of the life cycle stages and host plants for a range of butterflies and experience in identifying butterflies to the level of at least family. One member (GM) can identify butterflies to the species level with the aid of reference books. Contacts with Kew Herbarium and the NHM have been established for the CSBD. This expertise will be retained within Guyana for the immediate future improving the capability to deliver ecosystem services in this region and as a basis for future research collaborations. Protocols and experience of farming butterflies reside with the four community members of the team and HS from Iwokrama and are supported by the farming manual. They have access to butterfly expertise via NN and have made direct contact with one large butterfly farm in the UK. HS has experience in all the steps and procedures required for the export of live pupae. Skills were developed and enhanced in carrying out socioeconomic studies focused on interest and the feasibility for a new butterfly livelihood. Both MSc students had access to help from a biometrician from UW improving their ability to analyse research data. The students and community members of the team improved their management and leadership skills (within the team and in community outreach activities) and developed training skills. Most members of the team were/became extremely competent presenters and communicated the aims and outcomes of the project on radio, TV or in community meetings. Three radio Paiwomak presentations were prepared and delivered by the community members of the team. The community members in particular benefited from the opportunity to develop IT skills and were able to maintain contact with the UK team and Georgetown by e-mail and MSN messenger. They also made good use of digital cameras to contribute to the project outputs. The community members developed a reasonable understanding about running a business and the requirements for business plans and financial projections – all new concepts. One member (DD) attended a business training course.

The UW has gained experience in leading and administering DI projects. The UK Darwin workshops attended were extremely valuable in developing the project towards the Darwin goal. Feedback was provided to interested colleagues. This knowledge will be transferred and applied to any future DI funding awarded to the Department/University.

#### **4.7 Sustainability and Legacy**

The butterfly handbook and rearing manual should endure within the communities and as a result of promotion by the tour companies. The know-how to monitor, produce and export butterflies will endure in Guyana through the staff in the Institutions, the young people from the wildlife clubs and hopefully via the Bina Hill Institute, and the butterfly farm (Kawe Amazonica) (community training centre).

The two MSc students were seconded from Iwokrama and UG, respectively. They will continue their employment in Iwokrama and the CSBD at UG, enhancing the butterfly capacity for Guyana. In addition, the 4 Amerindian members of the team are still working at the butterfly farm and will be funded for a year post-project by WWF, Iwokrama, and NRDDB.

Village meetings and visits and workshops improved communications and different communities were brought together in workshops and demonstrations.

Darwin provided many resources for this project that will remain within the host country. The MSc students will continue to use their laptops. Two community members of the team also received laptops and these will be retained by them for butterfly business activities. Two project printers were purchased, one housed at the Iwokrama Field Station for use by the Amerindian team and the other housed at the CSBD. Each member of team received a “point and shoot” digital camera – these have been invaluable for recording specimens and relaying images to the UK for disease diagnosis etc. In addition, one MSc student received a digital SLR camera, which will be the property of the CSBD and will be invaluable for photographing new specimens. A valuable collection of reference butterfly books, for different families/subfamilies of South American butterflies, has been donated by the project to the CSBD for use by the CSBD and visiting researchers. Equipment such as butterfly nets, traps, gardening equipment,

a generator, and vehicle will be retained by the community farm. The butterfly house and office/shop will be permanent facilities on the butterfly farm. Specialised netting was left for satellite farmers to set up flight and fixing cages.

Iwokrama will maintain regular contact with the CSBD through the butterfly initiatives they are developing for the post-project period. The new Vice Chancellor of UG is keen to develop closer collaborations with Iwokrama and with the University of Warwick. The UK team (DW & NN) still keep in regular contact with HS from Iwokrama, who is processing the shipment of pupae from Guyana. Contact is also maintained with the butterfly farm team. NN processes the shipments when they arrive in the UK. This will be ongoing. HS, DG and RT from Iwokrama maintain close links with the NRDDDB. DW and NN will continue to communicate with the host country team via email and by internet chat messenger.

## **5 Lessons learned, dissemination and communication**

Relationships and an understanding of the host country's working environment is key and in future, more time should be allocated at the start of the project to allow for the in-country establishment of the project team, to allow for productive communication and to instil a culture for project working.

Changes in NRDDDB were not conducive to continuity and information flow. It took additional time and effort to establish a working rapport with new board members. Changes on the butterfly team required additional training inputs. In the project period Iwokrama were involved in many other activities and initiatives e.g. RT was involved in forest certification activities. Communication flow was limited to some extent. The UK had to rely on visits to the host country to get the full picture of activities and problems. E-mail contact was essential, however not always reliable, since there were frequent internet problems, particularly at the Iwokrama Field Station and a lack of effort to maintain contact, especially when there were problems. The handbooks produced as outputs from the project will significantly aid dissemination and awareness. The target audience for the two handbooks is: students, potential butterfly farmers, tourism guides, and community members.

Dissemination of the project has occurred in a number of forms; via the project website and the Warwick icast, via two butterfly handbooks, via ecotourism to visitors to the region, through the newly established database and specimen collection and herbarium collection. This dissemination will continue and develop after the project. The project is being continued for two months post-project in the first instance (Iwokrama funding) and then for an additional year with Iwokrama, WWF and NRDDDB funding. Dissemination of butterfly farming and biodiversity monitoring within the communities will be encouraged during this period by Iwokrama, CSBD and NRDDDB. Interest in displaying the North Rupununi butterflies in Georgetown has been raised and the Guyana Tourist Agency and community shops would like to promote the book to support ecotourism.

### **5.1 Darwin identity**

Members of the project team made a positive effort to link the project funding and project goal to the Darwin Initiative. The Darwin Initiative has been promoted in presentations, on posters and in meetings with in-country organisations and agencies. The Darwin logo is displayed on the Kawe Amazonica sign (which was made by a community member) to acknowledge DI funding; and on posters, slides and publications e.g. the butterfly ID sheet for Kawe Amazonica and the two butterfly handbooks. Darwin pens and pins were presented as prizes at the wildlife club festival. The laptops have Darwin logos imprinted on the front and the project vehicle has a Darwin logo on its side. Darwin funding opportunities have been promoted actively within Warwick HRI, and in other UW departments via the Warwick icast and by the presentations to post-graduate students and the Department by the two MSc students from Guyana. Notifications of DI funding opportunities have been forwarded within the UW. As a result of regular updates on the butterfly project and publicity a colleague from Warwick HRI has submitted a concept note for the latest round of DI funding. In the North Rupununi the project team was known as the "butterfly team" or "B team" and was recognised as a separate team

from the DI Wetland team. Their identity was linked to the Darwin project vehicle. Two Darwin Initiative projects were running concurrently during the life of the project and there was an appreciation for a larger programme within the in-country organisations and to some extent at the community level.

## **6 Monitoring and evaluation**

Minor changes were made to the log frame. The biodiversity survey was completed for one year instead of two because of a shift of half of the manpower to butterfly farming development after 18 months and the replacement of the MSc student. A six month pre-survey using hand netting only was conducted prior to the complete annual survey in which skills and know-how were developed. The deadline for peer review and publication of the handbook for local butterfly species was postponed from the middle of year 3 to the end of year 3, since the processing of the large numbers of butterfly specimens and database construction were extremely time consuming and rested principally on one of the MSc students (GM).

In the first year the project was selected for review and used as an example in a training workshop. This was extremely useful and valuable comments were provided, which were discussed with the project partners and responses made. As a result the log frame was modified slightly. A Gantt chart with key activities was produced for the reviewer and was used to manage the project. The activities are incorporated into the log frame in Annex 1. The reviewer's main concern was the lack of progress in producing the socioeconomic report. The reviewer's recommendations were extremely valuable but the team member (HS) who was responsible had multiple roles (leading the project in-country, driving the vehicle, participating in the butterfly surveys, and developing the butterfly farm) and carrying out the socioeconomic surveys and community development via meetings. As a result the socioeconomic report was produced but later than anticipated. HS will continue working with the team at the butterfly farm after the project finishes on behalf of Iwokrama.

As mentioned elsewhere the project design was slightly altered from the original proposal. A central butterfly house/training facility/ butterfly production centre was established as the "hub" as a basis for a community livelihood. This model took into account the lack of butterfly knowledge at the start of the project, the widespread distribution of the communities, difficulties in accessing some of the communities and the need for a holding and export facility.

Monthly reports were distributed to all members of the team for the socioeconomic surveys and the biodiversity surveys for feedback. Quarterly meetings were held for the team when the UK partners visited Guyana. Progress was assessed by the team and recommendations and changes agreed for the following quarter. Progress was stepwise, particularly in developing the butterfly farm. Regular feedback was maintained by e-mail and internet chat messenger. Community meetings and meetings with individual Toshiro and the NRDDDB were minuted.

The monitoring and evaluation feedback received from the DI team in the UK was very useful and was discussed with partners and team members.

### **6.1 Actions taken in response to annual report reviews**

We have responded to all issues raised in the reviews and annual reports. The reviews and responses were discussed with the partners and the team. As recommended the outputs were rationalised into 5 groups and as recommended the socioeconomic report took into account previously published reports.

This project was a feasibility study and our main concern is that continued expert support from the UK will be required after the completion of the project to support the implementation, maintenance and growth of this community business. Without this support the local team may struggle to make sufficient progress in the one year post-project period. The project provided only a relatively short time for the team to acquire experience of butterfly farming techniques and was not enough to address all eventualities relating to pests, diseases, new species production, dealing with changing weather patterns and dissemination to widely spread

communities. There was a significant increase in the development of the farm after each visit from the UK team members. Each team member carried out multiple functions in the project and in reality they have had only 18 months hands on experience in butterfly farming and most of this was as part of their learning curve.



## 7 Finance and administration

### 7.1 Project expenditure – 15-013: Biodiversity and Sustainable Development of Butterfly Production (Lepidoptera)

Expenditure category	Original	Final Budget	2006/07	2007/08	2008/09	2009/10	Total	Variance to Budget
	Budget							
Staff costs								
Rent, rates, heating, lighting, cleaning								
Postage, telephone, stationery								
Travel and subsistence								
Printing								
Conferences, seminars etc								
Capital items								
Others								
<b>Total</b>								

Staff costs	2006/07	2007/08	2008/09	2009/10	Total
D Winstanley - Project Manager					
N Naish - Entomologist					
K Payne - NHM Taxonomist					
MSc Students					
Rangers					
Amerindians					
<b>Total</b>					

<u>Agreed budget revisions</u>	2006/07	2007/08	2008/09	2009/10	Total
<b>Original budget award</b>					
Revision 1					
<b>Revised budget 1</b>					
Revision 2					
<b>Revised budget 2</b>					
Revision 3					
<b>Revised budget 3</b>					

## **7.2 Additional funds or in-kind contributions secured**

- A department of Warwick University (Warwick HRI) paid of £32,212.80 in registration fees for 2/3 MSc students from Guyana.
- The British High Commission donated £6630 towards the cost of roofing material for the butterfly house and towards building an office and office/tourist shop for the butterfly farm. £250 was donated towards the construction of a well at Kawe Amazonica. Tiger Woods Inc gave donations of materials and labour to the value of £900. They also provided a regular supply of timber off-cuts for the farm. In addition, they provided help in repairing machinery and transporting materials.
- The NHM and Kew gave time and instruction to the students on the project.
- The project received help from Iwokrama volunteers and from the Iwokrama Community Outreach Officer (SJ), who promoted the project and provided butterfly training to the wildlife clubs. Volunteers from UG and the Guyana National Museum assisted in preparing and cataloguing the butterflies from the survey.
- The SSOS organisation supports community businesses and provided helpful advice in setting up a community business in the North Rupununi.
- Conservation International (DS) granted an award to GP to assist with her travel to the UK to visit her supervisor and committee at UW, to present her work and to take up the Darwin Scholarship that she was awarded (see Appendix VI ; a PDF of GM's Darwin scholar's experience). Other funding was provided for this visit from the Darwin project via Iwokrama.
- Iwokrama will provide funding for salaries, food and accommodation at the Iwokrama Field centre for two months when this DI project finishes for the 4 Amerindian staff who run Kawe Amazonica. After this time both Iwokrama and WWF (US\$35,000) will support the staff for one year. This will cover basic requirements and limited training to help the business to become self-sufficient.
- The WD waived taxes on test shipments valued at £7428.25.
- Warwick HRI provided expert Biometric support to the biodiversity survey and the socioeconomic survey.

## **7.3 Value of DI funding**

The DI enabled the building of collaborations between the UK and Guyana to increase knowledge of butterfly biodiversity in the North Rupununi and build capacity to develop ecosystem services and to provide potential to sustainably exploit butterflies for livelihood benefits. The capacity of Iwokrama and the CSBD has been enriched and valuable data has been generated for the benefit of the scientific community. Contacts have been made to enhance collaborations between the UK and Guyana. The UK partners have been given an opportunity to use their skills to support communities in the sustainable exploitation of their resources and have gained first-hand experience of the pressures and changes on indigenous communities of the region. It was a privilege for the UK team to work along side the team members and communities.

## Annex 1 Report of progress and achievements against final project log frame for the life of the project

Project summary	Measurable Indicators	Progress and Achievements April 2007 - March 2008	Actions required/planned for next period
<p><b>Goal:</b> 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</p> <ul style="list-style-type: none"> <li>The conservation of biological diversity,</li> <li>The sustainable use of its components, and</li> <li>The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources</li> </ul>		<p>Baseline data and increased capacity towards monitoring the effect of environmental changes on butterfly biodiversity.</p> <p>Protocols and facilities established for the sustainable production of butterflies.</p> <p>Capacity established in the communities for the exploitation of butterflies on behalf of all 16 communities and the NRDDDB who are responsible for equitable sharing of benefits.</p>	<p>(do not fill not applicable)</p>
<p><b>Purpose</b> Develop (a system for) sustainable use of butterfly biodiversity in Iwokrama and North Rupununi, in Guyana, to enhance the livelihoods of local communities (insert original project purpose statement)</p>	<p>New knowledge of the butterfly and moth species including their host plant species of the Guyanese rainforest.</p> <p>A one year Biodiversity assessment completed.</p> <p>Trial butterfly farming system by local communities in place by end of year 3.</p>	<p>The life cycle stages and host plants for 19 butterfly species of commercial interest have been determined.</p> <p>The 12 month butterfly biodiversity survey was completed, collated and electronic database established.</p> <p>The life cycle stages and host plants of 19 butterfly species of commercial interest have been determined. Methods of farming these species published in a rearing manual.</p> <p>The central butterfly farm "Kawe Amazonica" was established on land donated in a Memorandum of Cooperation for the benefit of all 16 communities. Shipments of pupae</p>	<p>A proposal is being prepared to carry out a second butterfly biodiversity survey in the North Rupununi region.</p> <p>Continuation of taxonomical classification of butterflies to species level.</p> <p>The butterfly farm and dissemination activities will be funded for an additional year with funding from Iwokrama and WWF.</p> <p>The Memorandum of Cooperation will be renewed.</p> <p>Development of butterfly ecotourism.</p>

		<p>successfully dispatched to the UK. Satellite farms are still at an early stage in development.</p> <p>A socioeconomic survey was conducted to determine community interest in butterfly farming and a report produced (Appendix VII).</p> <p>To ensure legacy a follow-on proposal was submitted but was not successful. A successful proposal was developed for WWF to ensure legacy for Kawe Amazonica and sustainable community based butterfly farming.</p>	<p>Butterfly farming/training activities will be continued at Kawe Amazonica and dissemination increased towards a sustainable community business</p>
<p><b>Output 1.</b> <i>Butterfly biodiversity knowledge</i></p> <ul style="list-style-type: none"> <li>• Biodiversity and monitoring programme established and functioning through collaboration of two institutions.</li> <li>• Central species list established.</li> <li>• Collection of sample species from forest (male and female of species and host plants) and preparation for deposit</li> </ul>	<p>Two MSc students, two local Amerindians and two rangers from Iwokrama trained in biodiversity assessment techniques by the end of year 2, in collaboration with staff from Iwokrama and Warwick HRI.</p> <p>Deposition of specimens at the CSBD at the university of Guyana, including host plant species deposited in the herbarium</p>	<p>The monitoring capacity at the CSBD and in the communities of the North Rupununi region has increased. The butterfly team received training in butterfly monitoring, butterfly collection, data recording, and butterfly setting and identification for a period of two years. They were introduced to the characteristics of different host plant families and were able to identify key butterfly host plants. In addition, two MSc students received further training in butterfly and host plant identification via the CSBD in Guyana, and the NHM and Kew in the UK. Students from UG helped to set, photograph and catalogue the butterfly specimens, increasing their knowledge on butterfly biodiversity. Each specimen was digitally photographed and its image cross-referenced to its database accession number. The specimens collected form a new collection at the CSBD. The MSc student based at CSBD took responsibility for delivering the database and butterfly handbook. The identification of all 95 specimens in the handbook was confirmed by the NHM. All stages in development were recorded for at least 20 butterfly species with their host plants and were presented in a butterfly farming handbook. All of the team contributed to the butterfly biodiversity database and farming handbook. A large collection of specialist butterfly identification books for Neotropical butterflies was bought for the project and donated to the CSBD. A valuable resource. Important host plants of the butterfly species selected for farming were photographed prepared for deposit at the CSBD as recommended by Kew.</p> <p>Monthly field survey reports were prepared by the MSc student.</p>	

		The NRDDDB agreed to take responsibility for promoting the community livelihood and ensuring benefit sharing from the sustainable use of butterflies and will be supported by Iwokrama.
Activity 1.1 Recruitment of six trainees (2 MSc students. 2 Rangers and two Amerindians)		Completed
Activity 1.2 Inception workshop		Completed
Activity 1.3 Workshop for 6 biodiversity surveyors – data gathering, recording, butterfly and host recognition, time management (Yr 1) Completed		Completed
Activity 1.4 Field survey plots identified		Completed
Activity 1.5 Establish Biodiversity study protocols		Completed for team and some interested community members. Wildlife club training for younger members of the community.
Activity 1.6 Monthly surveys using fruit baited traps and hand nets, and visual observation for qualitative species incidence		Completed. Two attempts were made in carrying out the annual survey.
Activity 1.7 Survey reports prepared		Completed. Monthly survey reports were prepared.
Activity 1.8 Butterfly specimens set, photographed, accession numbers assigned and entered on an electronic database together with relevant information.		Completed. The volume of specimens collected for processing was greater than anticipated but all were processed with student help.
Activity 1.9 Butterflies identified to family and subfamily and stored in cabinets in taxonomic groups.		Butterflies from 5 different families and 10 subfamilies of Nymphalidae were collected. Fifty percent of the 4892 specimens collected were identified to genus and some to species.
Activity 1.10 Handbook on butterfly species from biodiversity survey		Completed. 90 copies have been produced. The book contains photographs of 95 common butterfly species from 5 different butterfly families, with information on their seasonality and location. Handbook is a resource for the communities; for guides, potential butterfly farmers and tourists This book will be launched in by the British High Commission in September 2009, in Guyana. There is already a lot of interest from ecotourism enterprises. It will be the first butterfly handbook for Guyanese butterflies.
<b>Output 2.</b> <i>Butterfly farming – scientific</i> <ul style="list-style-type: none"> <li>• Development of methods for farming butterflies.</li> </ul>	<ul style="list-style-type: none"> <li>• Manual produced on best farming methods in collaboration with local communities. 20 + copies to be distributed by midway through year 3.</li> <li>• Netting of first egg batch for all pupae to develop. Production of first set of pupae.</li> </ul>	A modified strategy for developing community butterfly production was used. A knowledge base was assimilated before any communities could farm butterflies of targeted and marketable species. The project started from very little information on the common species of butterflies in each of the habitat zones found in the North Rupununi Region or their seasonality. A defined sequence of steps was required to reach the goal of sustainable community based production of marketable species of butterfly pupae.
Workshop on plant and butterfly farming (Yr 1)		Completed. Knowledge acquisition ongoing
Activity 2.2 Workshop on diseases of Lepidoptera and disease free production		Completed. Application of information to farming practices ongoing.
Activity 2.3 Host plants identified and propagation methods developed.		Host plants identified and propagated for a range of commercially valuable species.

		Host plants identified for 20 + species of butterflies
Activity 2.4 Protocols for rearing butterflies developed		Valuable experiments were conducted to determine the effect of host plant choice, water availability and compost on the development time and quality of targeted butterfly species.  Butterfly rearing protocols (and protocols for host and nectar/pollen plant propagation) were developed for 19 butterfly species and published in the rearing handbook.  Methods were developed for producing synchronous batches of pupae for a range of species.
Activity 2.5. Develop Handbook on butterfly farming		60 copies of a butterfly rearing manual produced. It includes the host plants and life cycle stages for 19 farmable butterflies with images for each stage.
Activity 2.6 Determine interest from Amerindians (using handbook)		Handbook distributed to most of the Amerindian communities. All communities have received copies of the handbooks. More copies were printed and these will be distributed to the wildlife clubs and tour guides by the end of August 2009. The rearing manual has been distributed to the staff of the butterfly farm, the Toshao of Fair View and the NRDDDB. Two copies have been delivered to each community, one for the Toshao and the other for the wildlife clubs.
<b>Output 3.</b> <i>Butterfly farming –economic</i>  <ul style="list-style-type: none"> <li>• Trial of butterfly farming techniques by local farmers.</li> <li>• Production and breeding pupae methods</li> </ul>	Allocation of trial farming areas.  Netting of first egg batch for all pupae to develop. Production of first set of pupae  Collection of specimens of butterfly species from different habits (males and females) and their host plants and preparation for deposit.  Host plant species sown/transplanted	Only Fair View offered land to start a butterfly farm and this fulfilled the criteria required for a viable site. Since most of the communities adopted a “wait and see” approach having been disappointed by previous initiatives and having other time commitments this was the site where all the techniques were developed and the farm evolved as a central hub for a community based business. For a successful business it was necessary to produce synchronous batches of specific species of butterflies for export on a specific day. The transport time from the farm in Guyana to the distributor in the UK was critical since the pupae have to arrive in good condition and without emerging as adult butterflies. The batches are rejected if pupae develop into adults in transit or are near to emergence on arrival. This required detailed planning in regard to the availability of sufficient host plant for larval development, enough adult butterflies to lay eggs within a defined window of time and the correct nectar plants to maintain the butterflies during mating and oviposition. A system was developed using flight cages to allow the butterflies to mate and lay eggs in a small window of time and setting cages, where the developing larvae were reared on daily supplies of fresh host plant until pupation. This was a long way from the <i>in situ</i> rearing considered previously, which would yield asynchronous pupae of random species.  Two licences were obtained: 1. for a Holding Premises in the name of Fair View;

		<p>2. An export licence with H. Sambhu one of the team members from Iwokrama acting as the agent.</p> <p>Three consecutive successful shipments consisting of pupae of several butterfly pupae were delivered to the UK.</p> <p>Specimens of butterflies and the host plants supporting the farming business were deposited at the CSBD.</p> <p>Four communities received on-farm training in the butterfly and host plant propagation methods developed. One community has prepared host plant gardens ready for satellite production. Sufficient insect-proof netting has been provided by the project to set up satellite farms.</p> <p>More than 30 species of butterflies have been identified which are common in the North Rupununi region and are of commercial interest to butterfly display houses in the UK and Europe.</p> <p>Specimens of butterflies and the host plants supporting the farming business were deposited at the CSBD.</p>
Activity 3.1. Workshop on diseases of Lepidoptera and disease free production		Completed. The team has direct experience of pests and diseases and are developing methods of prevention. Lessons have been learnt from a recent pest and disease outbreak. .
Activity 3.2 Host plant species planted		Completed. Butterfly host plants planted from June 2007 to February 2008. Additional host plants being introduced. A range of potential host plants for the selected butterflies has been established on the farm, including <i>Passiflora</i> species (many are regarded as weeds in the forest), <i>Delacampia</i> sp. <i>Citrus</i> sp., banana, <i>Inga</i> sp., <i>Piper</i> sp., <i>Cassia</i> sp. and many other local plants. Some plants were introduced by the team from their own communities. In addition, nectar and pollen plants have been planted to feed the adult butterflies e.g. <i>Lantana</i> .
Activity 3.3. Pupae produced		<p>Three consecutive successful test shipments consisting of pupae of several butterfly species were delivered to the UK. However, the first weekly batches of synchronous healthy saleable pupae were successfully despatched in Feb 2009 to the UK and were sold.</p> <p>An export market has been developed for the pupae but the quality and supply has been erratic more recently due to lack of continuous staffing capacity on the farm. This has been addressed but it will take time to return to the situation of regular supplies of healthy pupae. However, the first new shipment of healthy pupae arrived in good condition in the UK and there is cause to be optimistic. It</p>

		will just take time to recover.
Activity 3.4 Workshop on butterfly breeding for local Amerindians		Representatives from three communities attended a workshop and observed host plant and butterfly rearing techniques on the farm, and discussed the structure of the proposed community based business; including business plans. Although the host plants, butterfly species and farming protocols had been determined prior to the workshop the final handbook was not available. One community has propagated host plants ready for satellite production. Sufficient insect-proof netting has been provided by the project to set up satellite farms in most of the communities. Members of the team visited four communities (including the 3 that later attended the workshop) to give demonstrations and were available to provide help. Members of the butterfly team were from the same 3 communities.
Activity 3.5. Determine interest from Amerindians (using handbook)		The butterfly rearing handbook has now been distributed to all the Amerindian communities. More copies are being printed and these will be distributed to the wildlife clubs and tour guides by the end of August. The rearing manual has been distributed to the staff of the butterfly farm, the Toshao of Fair View and the NRDDB. Two copies have been delivered to each community, one for the guides and the other for the wildlife clubs and to the Bina Hill Training Institute.
<b>Output 4.</b> <i>Business/community development</i>	Business plan developed for Kawe Amazonica and satellite producers Community outreach  Village group and meeting support	We were fortunate that both NN and Dane Gobin (DG, from Iwokrama) had experience in producing business plans. A workshop was held on business planning and a business plan was developed in conjunction with NN, HS and Dane Gobin from Iwokrama (Appendix VIII). Financial forecasts were made for a 2 year period for Kawe Amazonica and a satellite farm. This was a joint team activity. The outreach activities through the wildlife clubs were very successful. We were fortunate to have the secretary of a wildlife club (VJ) on the team. The team worked with SJ the outreach officer in disseminating butterfly activities to the clubs and were involved as a team in the wildlife festival. HS was a familiar face in the North Rupununi and respected by the communities and NRDDB. This was a great advantage. Frequent meetings were held with Fair View and communities close to the survey sites. We presented project progress to the NRDDB meetings.
Activity 4.1. Village groups and meeting support		Completed. Meetings were held with all of the 16 communities in the North Rupununi region. There was regular dialogue with communities close to the survey sites, in particular Fair View. Copies of the minutes are held at Iwokrama and UW.
• Collation of results of the community surveys		Completed. The results are held at Iwokrama and UW. The survey results were analysed in conjunction with a biometrician from UW. There was positive interest in the new initiative but the communities adopted a “wait and see” approach. This



	was also echoed by the NRDDDB. However, Fair View was willing to become involved at an early stage and donated land and resources. At the end of the project NRDDDB pledged their support for a community based butterfly business and agreed to become directly involved.
<ul style="list-style-type: none"> <li>Determine number of local Amerindians who would like to trial butterfly breeding and train at workshop using handbook.</li> </ul>	<p>It was not possible to involve all 16 widely dispersed communities in training workshops at Fair View due to financial constraints. Aranaputa was the most enthusiastic community and planted host and nectar plant gardens for several butterfly species. Different communities occupy different habitat zones and as a result communities can farm different butterfly species that are abundant in their areas using the farming manual. This will increase the variety of species for export.</p> <p>The butterfly biodiversity survey was completed in July 2008 and commercial species selected. The rearing manual and dissemination workshops were undertaken when the host plants, details of life cycles for farmable species and farming protocols had been determined (February 2009). Training was delivered to 4 interested communities in February 2009 using on-farm demonstrations and a workshop. The manual was printed in June 2009 and distributed to all the communities. It was well received since it provided a simple pictorial guide.</p>
4.3 Business plan developed	Completed. A business plan was developed in conjunction with NN, DG and HS. In addition, a financial forecast/assessment was also produced for Kawe Amazonica for a two year period. A forecast was also prepared for potential satellite farmers at the request of NRDDDB. It included set up costs and labour costs; community members do not usually assign a cost to their labour.
<b>Output 5.</b> <i>Capacity building</i>	<p>Increased butterfly biodiversity monitoring at CSBD, Iwokrama and within the communities. Increased business capacity at the central butterfly farm. One of the two MSc students (GM) (from the CSBD at UG) was selected as a Darwin scholar and was able to participate in the "Monitoring and Communicating Biodiversity" course in Shrewsbury, UK in August 2008. She holds a position in the CSBD and will be a valuable resource for Guyana. The second student (from Iwokrama) will submit his thesis on the development of butterfly farming in Guyana in October 2009. He will continue his employment with Iwokrama and will continue working with the butterfly farm. His input will be critical to the success of the new business.</p> <p>A team of 7 (including the 2 MSc students, and one additional community member)) has received training in butterfly biodiversity monitoring and butterfly farming. Each trainee was presented with a "Certificate of Completion" ( see Appendix IX) from the University of Warwick, listing all the aspects of training covered in the workshops and related practical work. Many students, community members, Iwokrama field station staff, students groups, wildlife clubs and tourists</p>

		<p>have participated in educational visits at the farm. The Wildlife clubs from each community were introduced to butterflies in their environment via Iwokrama's outreach programme.</p> <p>Resources: Books and equipment have been provided by the project. The CSBD was given a collection of butterfly identification reference books and members of the team were given a copy of the "Butterflies of South America". Butterfly nets, butterfly traps and butterfly setting equipment and display drawers were funded by Darwin. Local labour was used to make the traps and some butterfly nets. Five laptop computers and a printer, as well as digital cameras were provided for the team and left in country for post-project activities. A vehicle was purchased for use in the surveys and for travel to and from Georgetown. The vehicle will be used by the farm post-project.</p>
<p><b>Output 6.</b> <i>Dissemination</i></p> <ul style="list-style-type: none"> <li>• Production and distribution of handbook about local butterfly species.</li> </ul>	<p>Central species list established</p> <p>Handbooks</p> <p>Publicity material and knowledge transfer</p>	<p>Completed. An electronic database cross-referenced to images of each specimen was established at the CSBD and a copy will be sent to the NHM. This will be available also from CSBD and Iwokrama. A new butterfly collection is available at the CSBD for researchers. Duplicates will be sent to the NHM.</p> <p>Completed. The two handbooks were published and distributed to aid dissemination. The legacy community team members will act as trainers.</p> <p>Presentations were made to communities, stakeholders and other collaborators (PDF copies of examples attached to report, Appendix X).</p> <p>An icast commissioned by the UW proved very effective and appeared on varies websites including You-tube. TV broadcasts were made in Guyana and the UK. Radio presentations were prepared and delivered by the team for Radio Paiwomak, which serves the North Rupununi. The project was highlighted in 2 national newspapers in Guyana and three regional newspapers in the UK.</p> <p>The project is highlighted on two websites:  <a href="http://www.iwokrama.org/home.htm">http://www.iwokrama.org/home.htm</a>  <a href="http://www.Guyanabutterflies.com">http://www.Guyanabutterflies.com</a></p> <p>Documents and results will now be loaded onto the gyanabutterflies.com website and it will serve also as a functional website for the internet based butterfly business.</p> <p>An identification sheet with images (Appendix XI) has been produced for the butterflies on the farm. This will be available for visiting students and tourists.</p>

	<p>MSc thesis based on butterfly biodiversity data</p> <p>Prepare papers for submission in a peer reviewed journal.</p>	<p>Educational tours are given at the farm to all visitors and butterfly farming training provided.</p> <p>A farm shop/office has been built to sell butterfly related gifts and the Darwin books and butterfly ID sheet (Appendix XI).</p> <p>A thesis was submitted in June 2009 entitled "Biodiversity and ecology studies on butterflies from the Iwokrama Rainforest Reserve and the communities of the North Rupununi District, Guyana, South America: a baseline study".</p> <p>In progress.</p>
	<p>Production/training /ecotourism centre established</p>	<p>An impressive community butterfly farm was established, with butterfly house, setting and flight/mating cages, host plant gardens, nectar plants, a well and a gift shop/office. This will act as the "hub" for the community butterfly business and will be the centre of expertise, training, research and development, production and an ecotourism attraction. Its future will be dependent on the success of the butterfly exports and the number of satellite farms that develop that can add to the hubs production of pupae for export. The business will have to raise enough money to pay salaries and overheads for the core staff. The farm is the point of export for butterfly pupae.</p>

## Annex 2 Project's final log frame, including criteria and indicators

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p><b>Goal:</b></p> <p>To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but poor in resources to achieve  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>			
<p><b>Purpose</b></p> <p>To increase knowledge of the butterfly diversity and to sustainably exploit these populations within the Iwokrama forest and surrounding community areas.</p>	<p>New knowledge of the butterfly and moth species including their host plant species of the Guyanese rainforest.</p> <p>Biodiversity assessment for at least one year completed.</p> <p>Trial butterfly farming system by local communities in place by end of year 3.</p>	<p>Field survey reports and publications by partner institutions, including newsletter articles.</p> <p>Handbook of butterfly species and their host plants completed and published on the internet.</p> <p>Trial butterfly farmers from local communities planted host plants in five different locations and started to breed pupae.</p>	<p>Ministry of Amerindian Affairs continues to support sustainable development within the North Rupununi region.</p> <p>The Government of Guyana continues to support Iwokrama.</p>

<p><b>Outputs</b> Biodiversity and monitoring programme established and functioning through collaboration of two institutions.</p>	<p>Two MSc students, two local Amerindians and pool of rangers from Iwokrama trained in biodiversity assessment techniques by the end of year 2, in collaboration with staff from Iwokrama and Warwick HRI.</p>	<p>Database established on butterfly biodiversity data (written and illustrative data) including information on stages of development.</p> <p>Field survey reports.</p>	<p>Trained staff remains within the institution and / or University and train others to use the skills gained.</p> <p>N/A.</p>
<p>Production and distribution of handbook about local butterfly species.</p>	<p>Manual peer reviewed and publication date established. 20 + copies to be distributed before the end of year 3.</p>	<p>Comments received from peer review panel.</p> <p>2 copies sent to Darwin Initiative.</p>	<p>Biodiversity data supports the viability of a sustainable butterfly farming business.</p>
<p>Development of methods for farming butterflies.</p>	<p>Manual peer reviewed and publication date established. 20 + copies to be distributed by midway through year 3.</p>	<p>Comments received from peer review panel.</p> <p>2 copies sent to Darwin Initiative.</p>	<p>Continued support, co-operation and participation from local populations.</p> <p>Continued Government support for sustainable development.</p>
<p>Trial of butterfly farming techniques by local farmers.</p>	<p>Allocation of trial farming areas.</p>	<p>Records of all village meetings and workshops attended.</p> <p>Host plant species sown / transplanted onto plot.</p>	<p>Host butterfly species able to develop into pupae within determined plot area.</p> <p>No pest and disease outbreaks.</p>
<p>Production and breeding pupae methods.</p>	<p>Netting of first egg batch for all pupae to develop. Production of first set of pupae.</p>	<p>Production of first set of pupae.</p>	<p>N/A</p>
<p>Central species list established.</p>	<p>Collection of sample species from forest (male and female species and host plants) and preparation for deposit.</p>	<p>Deposition of specimens at the CSBD centre at the University of Guyana. Including host plant species deposited in the herbarium.</p>	

## 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	10	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		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	10	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		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	20	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	10	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	10	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.
16. Access to and Transfer of Technology	10	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

Article No./Title	Project %	Article Description
		sector facilitates such assess and joint development of technologies.
17. Exchange of Information	10	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	5	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 (e.g. 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)
<b>Training Measures</b>		
1a	Number of people to submit PhD thesis	
1b	Number of PhD qualifications obtained	
2	Number of Masters qualifications obtained	0 (1 submitted in June 2009 – result unknown; 1 to be submitted Oct. 2009)
3	Number of other qualifications obtained	2 community members of the team passed their motor cycle test
4a	Number of undergraduate students receiving training	
4b	Number of training weeks provided to undergraduate students	4
4c	Number of postgraduate students receiving training (not 1-3 above)	
4d	Number of training weeks for postgraduate students	
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification( i.e. not categories 1-4 above)	6 received at least 2 years training in butterfly diversity and butterfly farming
6a	Number of people receiving other forms of short-term education/training (i.e. not categories 1-5 above)	3 potential satellite farmers plus parties of school children; wildlife clubs and adult community members and other visitors receiving educational visits to the farm
6b	Number of training weeks not leading to formal qualification	Ongoing training throughout the project in particular when UK partners in country. 6 weeks formal training.  1 week training for Darwin Scholar in the UK
7	Number of types of training materials produced for use by host country(s)	4 Power point presentations of training course material with handouts. One butterfly identification handbook, 1 butterfly rearing annual with images of life cycle stages for 19 butterfly species and one pictorial leaflet for butterfly identification on the farm.
<b>Research Measures</b>		
8	Number of weeks spent by UK project staff on project work in host country(s)	42
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country(s)	
10	Number of formal documents produced to assist work related to species identification, classification and recording	One short protocol for butterfly preparation and recording. Comprehensive collection of specialist butterfly reference books donated to CSBD



<b>Code</b>	<b>Description</b>	<b>Totals (plus additional detail as required)</b>
11a	Number of papers published or accepted for publication in peer reviewed journals	
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 database of butterflies from the North Rupununi region with related information. Accession numbers cross-referenced to digital images. Available from CSBD and Iwokrama
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	
13a	Number of species reference collections established and handed over to host country(s)	1 new collection of butterflies established needs reorganising into taxonomic groups by CSBD in Guyana
13b	Number of species reference collections enhanced and handed over to host country(s)	
<b>Dissemination Measures</b>		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	4
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/ disseminated.	3
15a	Number of national press releases or publicity articles in host country(s)	2 (See Appendix XII)
15b	Number of local press releases or publicity articles in host country(s)	1 poster presented at the Amerindian Heritage Festival
15c	Number of national press releases or publicity articles in UK	1. The butterfly farm established in this project is included in the new Bradt travel guide for Guyana
15d	Number of local press releases or publicity articles in UK	3
16a	Number of issues of newsletters produced in the host country(s)	2 (Iwokrama Newsletter & Wetland Bulletin)
16b	Estimated circulation of each newsletter in the host country(s)	200 for each and on webpage links
16c	Estimated circulation of each newsletter in the UK	
17a	Number of dissemination networks established	1
17b	Number of dissemination networks enhanced or extended	1
18a	Number of national TV programmes/features in host country(s)	3
18b	Number of national TV programme/features in the UK	1
18c	Number of local TV programme/features in host country	
18d	Number of local TV programme features in the UK	Icast of project funded by UW distributed the web. One interview BBC West Midlands
19a	Number of national radio interviews/features in host country(s)	

<b>Code</b>	<b>Description</b>	<b>Totals (plus additional detail as required)</b>
19b	Number of national radio interviews/features in the UK	
19c	Number of local radio interviews/features in host country (s)	3 sessions prepared and broadcasted on Radio Paiwomak by the team. 1 publicity session at the beginning of the project to invite applicants for the positions
19d	Number of local radio interviews/features in the UK	
<b>Physical Measures</b>		
20	Estimated value (£s) of physical assets handed over to host country(s)	£18,600 + butterfly house (£25,640) + farm
21	Number of permanent educational/training/research facilities or organisation established	1. The butterfly farm (Kawe Amazonica) serves all the functions listed
22	Number of permanent field plots established	1
23	Value of additional resources raised for project	£39,862.8
<b>Other Measures used by the project and not currently including in DI standard measures</b>		
icast	<a href="http://www2.warwick.ac.uk/newsandevents/icast/archive/s2week25/butterfly/">http://www2.warwick.ac.uk/newsandevents/icast/archive/s2week25/butterfly/</a>	
	<a href="http://www.iwokrama.org/dwsite/ButterflyProject.htm">http://www.iwokrama.org/dwsite/ButterflyProject.htm</a>	

## Annex 5 Publications

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (e.g. contact address, website)	Cost £
Posters	Butterfly farming in Guyana		<a href="http://www.lwokrama.org">www.lwokrama.org</a>	5.00/bk
Book	An Introduction to butterflies of the Iwokrama forest and Communities of the North Rupununi District, Guyana, South America	Printed in the UK		9.00/bk
Book	Butterfly farming in the Iwokrama forest and North Rupununi region of Guyana, South America	Printed in the UK		5.00/bk
University of Warwick Website	Butterfly Farming to help save rainforest  Article and press release		<a href="http://www2.warwick.ac.uk/newsandevents/pressreleases/NE1000000209270/">http://www2.warwick.ac.uk/newsandevents/pressreleases/NE1000000209270/</a>	
Physorg.com	University of Warwick Butterfly Farming to help save the rainforest		Podcast	
New Agriculturist	Butterfly Farming to help save the rainforest 14/06/06		Podcast	
Terradaily	News Brief 06-4 Butterfly Farming to help save the rainforest		Podcast	
TV	BBC West Midlands News			
Coventry Observer	Plan takes off Kara Bradley 22/06/06			
Coventry Evening Telegraph	Butterfly Farming to help save the rainforest 19/06/06			
Stratford upon Avon Herald	Butterfly Farming to help save the rainforest 15/06/06			
TV interview (Guyana)	NN, KH and HS (July 2007)	National Communication Network –	NCN	

		Georgetown, Guyana. SA		
TV (NCN) Breakfast TV Interview on "Good Morning Guyana"	GM, HS (April 2008)	National Communication Network – Georgetown, Guyana. SA	NCN	
Guyana National Newspapers "Stabroek and Kaieteur News"	"Butterfly Industry to take flight" GM, HS	Stabroek News paper and Kaieteur New paper. Both papers are located in Georgetown, Guyana	Archives of Newspapers <a href="http://www.stabroeknews.com/?p=571">http://www.stabroeknews.com/?p=571</a>	
Department seminar at Warwick HRI UK	GM and HS (March 2008)		University of Warwick (DW)	
Two poster presentations at Warwick HRI Post-graduate Symposium	NN and HS (March 2008)	University of Warwick		
PowerPoint presentation to EPA Guyana	HS and KH	Butterfly project	Available from DW and HS	
PowerPoint presentation to "Friends of Iwokrama"	NN (December 2007)	Butterfly project	Available from DW and HS	
Broadcasts on Radio Paiwomak	Three sessions prepared and it is repeated DD, RR, AJ, VJ	Radio Paiwomak – North Rupununi, Guyana SA.	CD available DW and HS	
icast University of Warwick	DW and NN (May 2008)	University of Warwick	<a href="http://www2.warwick.ac.uk/newsandevents/icast/archive/s2week25/butterfly/">http://www2.warwick.ac.uk/newsandevents/icast/archive/s2week25/butterfly/</a>	
Project website	NN	University of Warwick	<a href="http://www.guyanabutterflies.com">www.guyanabutterflies.com</a>	

## Annex 6 Darwin Contacts

<b>Ref No</b>	15-013
<b>Project Title</b>	Biodiversity and sustainable development of butterfly production (Lepidoptera) in Guyana
<b>UK Leader Details</b>	
Name	Dr Doreen Winstanley
Role within Darwin Project	Project Leader
Address	Warwick HRI, Wellesbourne, Warwick, CV35 9EF
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Fax	
Email	
<b>Other UK Contact (if relevant)</b>	
Name	Mr Neil Naish
Role within Darwin Project	Consultant for butterfly farming
Address	Oxitec Ltd
Phone	
Fax	
Email	
<b>Partner 1</b>	
Name	Dr Raquel Thomas
Organisation	Iwokrama International Centre for Rain Forest Conservation and Development
Role within Darwin Project	Host country co-ordinator
Address	Iwokrama, 77, High Street, Kingston, Georgetown, Guyana
Fax	
Email	
<b>Partner 2 (if relevant)</b>	
Name	Mr Calvin Bernard
Organisation	The Centre for the study of Biological Diversity
Role within Darwin Project	Partner
Address	CSBD, University of Guyana, Turkeyen Campus, Georgetown, Guyana
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Email	