

Darwin Project Information

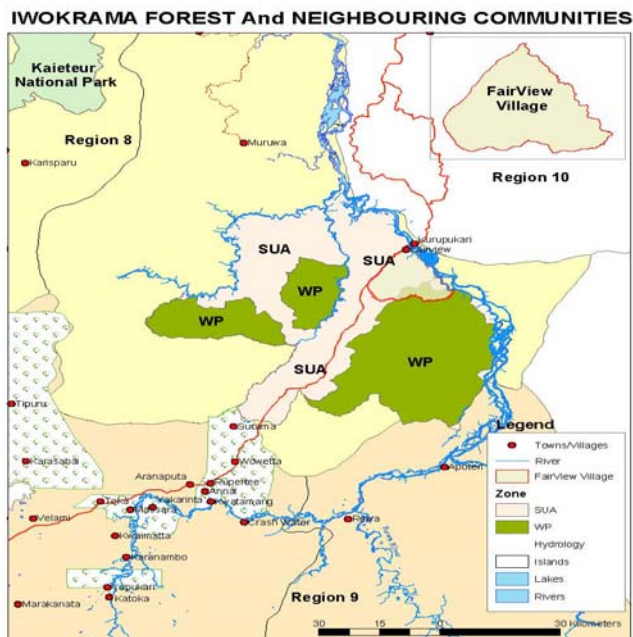
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|---|---|
| Project Ref Number | 15/013 |
| Project Title | Biodiversity and sustainable development of butterfly production (Lepidoptera) in Guyana. |
| Country(ies) | Guyana |
| UK Contract Holder Institution | University of Warwick |
| UK Partner Institution(s) | Natural History Museum, Kew Gardens, Matthews Payne & Bond LLP |
| Host country Partner Institution(s) | Iwokrama International Centre for Rain Forest Conservation and Development, The University of Guyana. |
| Darwin Grant Value | £322993 |
| Start/End dates of Project | July 1 st 2006 to June 30 th 2009 |
| Reporting period (1 Apr 2006 to 31 Mar 2007) and annual report number (1,2,3..) | April 2006 to 31 March 2007 Annual Report No. 1 |
| Project Leader Name | Dr Doreen Winstanley |
| Project website | Guyanabutterflies.com |
| Author(s), date | Dr Doreen Winstanley, April 2006 |

1. Project Background

The purpose of this project is to undertake a biodiversity survey of the butterfly (Lepidoptera) community and their host plants, within the Iwokrama International Centre for Rain Forest Conservation and Development Reserve, Guyana, which will form the basis for a conservation strategy and a measure of the potential to set up a sustainable butterfly farming co-operative within the North Rupununi District of Guyana. In 2001, one million acres of pristine rainforest were zoned into Sustainable Utilization and Wilderness Preserve. This project is inspired by the Kipepeo project near Malindi in Kenya, where since 1993, over 700 butterfly farmers have earned more than US\$447,000 in revenues from butterfly exports. The model and methodology of local sustainable exploitation of butterfly species has been highly successful in Kenya and monitoring has shown that butterfly farming does not deplete the natural populations of butterflies. One of the project team (Neil Naish) has had direct experience of this project as a voluntary consultant. At the University of Warwick we have an interest in Lepidoptera and have staff with expertise in butterflies and moths, butterfly farming and insect pathology. We were made aware (by a Dr Katharine Payne, a consultant on this project, who had spent one year in Guyana on VSO some years previously) of the **need to create new opportunities for sustainable non-timber forest products (NTFP), to benefit the livelihoods of the communities from the Iwokrama rain forest and North Rupununi district in Guyana.** This region has great potential as a source of butterfly biodiversity and sustainable butterfly farming.

Guyana is situated along the North Eastern Coast of South America 56°20'W and 61°23'W, and 1°10'N and 8°35'N (Wright 1998). The characteristic vegetation is tropical rainforest interspersed by patches of savannah. Tropical rainforests are renowned for their high diversity of fauna and flora in what has been called a 'luxuriance of life', and lowland evergreen rainforests such as the Iwokrama Forest Reserve are thought to be the most species rich out of all tropical rainforest. One main road runs from Georgetown the capital to Lethem where the ferry crosses to Brazil. This unpaved road is the main route for timber and commercial and private vehicles travelling from Georgetown to Brazil and road through the Iwokrama forest. There are two small airstrips in the target area, one at Annai and one at Fairview.

This project will involve the collaboration of up to sixteen indigenous Amerindian communities within the reserve and the surrounding North Rupununi. The intention is to engage and involve the communities directly at an early stage and to share knowledge and training with the widest group of Amerindians as possible by cascade learning, demonstration plots and training to ensure a strong legacy of know-how and interest in butterflies.



2. Project Partnerships

Partnerships between the UK and Guyana

Between July 2006 and March 2007 we made three visits to Guyana, each lasting between 10-14 days, in July and November 2006 and February 2007. The aim was to establish effective communication, to facilitate the selection of the project team, to carry out training for in-country project staff and to ensure that the project was implemented following the project proposal logical framework to achieve the outputs. Dr Katharine Payne accompanied us on the first visit in July. She had worked in the target area, namely Iwokrama forest and the North Rupununi area for one year as a VSO student and had a good relationship with Dr Raquel Thomas (our collaborator at Iwokrama). Her advice based on direct experience of the areas and the communities and her introductions to key people were invaluable.

The main partners in Guyana are Iwokrama International Centre for Rain Forest Conservation and Development and the University of Guyana including the CSBD. Good relationships have been developed with all in-country partners following the three visits. The first visit centred on organising recruitment of the team and preparing a 3 month plan. We have worked very closely with and gained support from the University of Guyana namely; Dr Philip da Silva (Dean of faculty of Natural Sciences) and Mr Calvin Bernard (CSBD), and the Iwokrama International Centre, namely; Dr Raquel Thomas (our collaborator), Dr David Singh (Chief Executive), Mr Dane Gobin (Accounts), Mr Hemchandranauth Sambhu (Sambhu) (team member) and Miss Samantha James (Outreach officer). Dr Raquel Thomas and Sambhu have been very important in organising the programme for our in country visits. Sambhu is the co-ordinator for the day-to-day running of the project in-country.

This project is building capacity to meet their CBD commitments through documenting butterfly biodiversity and identifying their host plants; and developing the potential for sustainable livelihoods in the target areas of the Iwokrama rainforest and surrounding North Rupununi District.

Partnerships with other UK or Regional partners

The UK lead Institution was able to provide a lepidopteran expert (Mr Neil Naish) who also has hands on experience in producing exotic butterflies and moths for commercial purposes e.g. for research and butterfly houses. His expertise is complemented by that of the Natural History Museum and the Smithsonian who will assist in the future with the identification of unfamiliar butterflies (entomologists from the Smithsonian are currently working alongside the butterfly team during their month long visit to collect insects). Recently we received our EPA permit which enables us to send specimens of Lepidoptera and host plants out of the country to UK partners and the Smithsonian Institute. The host plants of many of the butterflies are unknown. As new butterfly host plants are confirmed some will be sent to Kew Gardens for formal identification, particularly the passifloras. The University of Warwick also has expertise in lepidopteran diseases and there will be training in insect pathology to facilitate the production of healthy insects. Residents in the communities have also provided valuable information, relating to butterfly habitats and host plants.

Other Stakeholders

NRDDB

The North Rupununi District Development Board (NRDDB) is a community based organisation composed of village leaders and community representatives and represents 5000 individuals in the 16 communities of the region. The original letter of support for our proposal was obtained from the old board. The team, including UK staff met with NRDDB in July 2006 at Rockview, Annai, (Board members; Norbet Salty (Vice Chair), Delana Davis (youth representative), Joeyna Zammett, Sidney Allicock (senior councillor from Surama who also works at Bina Hill) and Mike Williams (senior councillor from Annai)). Since this time a new board has been formed and discussions have taken place with the current chairman, William Andries. Sambhu also presented the "butterfly project" to the NRDDB Board in August and to all the communities via a manned poster in the "Darwin Booth" at Annai in Heritage Month celebrations. All communities are now aware of the project and it is hoped that all communities will be given an opportunity to become involved, but at the same time it is realised that some communities are situated in more butterfly rich areas or nearer access routes. The NRDDB took the lead by advertising (via e-mail, local radio and posters) and interviewing for two community representatives to be members of the "butterfly team". Two were selected; however, one of the successful candidates resigned and had to be later replaced. The Iwokrama International Centre has close links with the NRDDB and it was agreed that Iwokrama would be responsible for organising payments to the community representatives via NRDDB. The NRDDB are positive and supportive about sustainable butterfly production by the communities for commercial gain and to conserve the butterflies.

The British High Commission

We have visited the Deputy High Commissioner at the British High Commission in Guyana to keep the Commission updated on the progress of the butterfly project. He was very supportive and felt that butterflies would have an important part to play in ecotourism as well as a sustainable export business. The Commission may have access to a potential source of funds for a butterfly house to complement the proposed Wetland Centre, which has their financial support.

Environmental Protection Agency (EPA)

We have visited the EPA on each visit to Guyana to progress the issuing of a specimen collection licence for the project and met Annie Pitamber and Dr Ramdass. We received the licence on our last visit in March 07 which will be valid for the duration of the project. We have discussed the project at length and the project team in Guyana will present a seminar to both the EPA and the Wild Life Division to update them of our progress.

The Wildlife Division

We have visited the wildlife division on each visit to Guyana to discuss any potential problems with exporting live pupae with Dr Alorna Sankar (CEO). They appear to have no problem with our exporting live pupae and are supportive. They see no problem with the Iwokrama International Centre acting as the exporters for the community based businesses. They have been very co-operative.

Other Collaborations

In Guyana we made contact with Dr Jayalaxshri Mystry and Dr Andrea Berardi from the Darwin Initiative funded Wetland Project covering the North Rupunui District. We have agreed to share information to the mutual benefit of both projects. The Wetland project will supply information on the flora and geological zones of the North Rupununi and the butterfly project will provide information to enhance the ecotourism aspect of their project by providing resources for the proposed Wetlands Centre e.g. butterfly trails with butterfly guides and possibly a butterfly display.

The butterfly team have also recently been working co-operatively alongside members of the Smithsonian Institute who have been surveying insects around the Iwokrama field station.

The CBD focal point in Guyana is Dr Roger Luncheon, Head of Presidential Secretariat based in Georgetown and Mr Doorga Persaud, Executive Director of EPA. So far we have not made contact with Dr Luncheon but we visit EPA each time we visit Guyana to update them on our project. The MSc students will give a seminar at EPA to give an update of the project to EPA and the wildlife Division.

We have contact with Mr Calvin Bernard from the CSBD at the University of Guyana. The new butterfly collection will be housed in the CSBD and the existing butterfly collections reviewed.

The UK partnership is gaining experience in dealing with a wide range of contributors. There was some lack of effective communication regarding in-country budgets and payments but that has been resolved to everyone's satisfaction.

3. Project Progress

3.1 Progress in carrying out project activities

Biodiversity and monitoring programme established and functioning through collaboration of two institutions.

Workshops

Involvement of partner in selecting MSc students

On the first visit to Guyana we held meetings at the Iwokrama International Centre and the University of Guyana to discuss the selection of the MSc students and other members of the team. The MSc student posts were advertised and the successful students were selected by the University of Guyana. Both were graduates from the University of Guyana; one had several years experience working for Iwokrama International Centre and had previous experience of the target areas through the Darwin Initiative funded Wetland Project in Guyana. Our intention was to register the students at the University of Guyana but after protracted discussions with Dr Phillip da Silver (Dean of faculty of Natural Sciences), Mr Calvin Bernard (CSBD) and the students, both the University of Guyana and students preferred that the students be registered at the University of Warwick with co-supervisors being appointed at the University of Guyana. This was only made possible because the Warwick HRI department of the University of Warwick granted a bursary to cover the large difference between the fees at the University of Guyana and at Warwick. One of the students is now registered and the other registration is in progress. The University of Guyana is actively involved in the project. The CSBD at the University of Guyana will be used as a reference centre for this diversity study and will house the new butterfly collection together with the existing collections which will be catalogued.

Formation and training of the butterfly team

The butterfly team consisting of six trainees (two MSc students, two rangers and two Amerindians) was in place by November 2006. All positions were advertised. The NRDDDB selected the community workers, the University of Guyana selected the MSc students and the Iwokrama International Centre for Rain Forest Conservation and Development selected the rangers. The two trainee rangers (Arnold Jacobus and Rayon Roberts) joined the project at the end of their intense training course in November 2006 and will complete their training as rangers on this project. Two community workers selected were Verley Jacobus and Eleanor Dorrick. Eleanor resigned and was replaced by Dolano Davis in February 2007. The two MSc students selected were employees from the University of Guyana and the Iwokrama International Centre respectively. The students were given professional development leave for the period of their MSc and both organisations will therefore benefit directly from their training and research. A training course was delivered to members of the team (excluding the rangers who were still attending a ranger training course) in November 2006 which focused principally on a thorough understanding of the project, butterfly biodiversity assessment techniques and butterfly identification. The whole team received further training on butterfly collecting, sample preparation, labelling, preservation and identification, in February 2007. The training courses were delivered at the Iwokrama Forest Training Centre. Training will be ongoing for the period of the project and an insect disease management course will be carried out in July 2007. The MSc students have access to the University of Warwick literature databases as well as relevant post-graduate courses. A visit to the University of Warwick to attend the post-graduate symposium and post-graduate training courses is planned. In addition, visits are planned to the Natural History Museum, Kew and various Butterfly houses in the UK. Other training courses such as IT courses are offered by the Bina Hill Institute and the team members will take advantage of this additional training. This is an excellent venue for residential training courses.

All the team members have made excellent progress and are very conscientious and enthusiastic.

The one year training programme will last until November 2007, since it was not possible to start until November 2006 after the team was in place. The outputs of the MSc students will also be delayed.

Field Research Programme

Biodiversity Study

This is the focus of the MSc project for Kaslyn Holden-Collins.

The function of the butterfly biodiversity study is:

- Identify and describe new butterfly species, stages in their life cycle and host plant.
- Establish butterfly host-plant relationship.
- Develop a database system for the new and old butterfly collections at the Centre for the Study of Biological Diversity, University of Guyana.
- Develop good butterfly baiting practices for the communities of the North Rupununi District.
- Provide information that will stimulate and facilitate the farming of different families of butterfly, e.g. morphos, heliconius, caligos, etc.
- Identify species of economic significance in the butterfly trade from biodiversity surveys.
- Facilitate the making of a handbook/manual of butterfly species of Iwokrama and North Rupununi District with particulars of their distinct morphological features, life cycle, host plant and production methods.
- Contribute directly to butterfly conservation and that of the ecosystem in which they live, since one of Iwokrama's primary businesses is sustainable timber harvesting.
- Determine the most suitable sites for butterfly ecotourism.

In November 2006 seven habitat zones were selected to represent different habitats and elevations and it is already clear that different species are present in the different zones. The zones represent differing vegetation and habitats and transects were chosen to show: disturbed, non-disturbed, of savannah and wetland and an elevated mountain. This was

reduced to six in February 2007 since few butterflies were found in the Wowetta (savannah) transects. The six zones were Turtle Mountain, Canopy Walkway and Fairview village located in the Iwokrama reserve and the North Rupununi villages of Surama, Kwatamang, and Aranaputa. The transects were approximately 1km trails apart from the canopy walkway. A one-off collection of butterflies will be undertaken at Iwokrama Mountain (the highest point in the Iwokrama rainforest) but this will require the trail to be cleared in advance.

The initial surveys of the transects were carried out using butterfly nets. However, a full survey of these sites using both hand netting and bait traps will be carried out from April 2007 for one year. Large numbers of butterfly bait traps were made by the community in Fairview.

The initial surveys have produced some interesting data already. In the rainforest areas we have encountered many more of the Papilionidae, Heliconiidae and Morphidae as well as Nymphalidae such as Hamadryas and Anartia, an abundance of Pieridae (Whites and sulphurs) and many Hesperidae, Lycaenidae and Riodinidae. A complete list of species is not yet available but the collection, preparation, identification and cataloguing will all be available in the public domain in due course. The Savannah, being primarily grassland, is unsurprisingly, rich in grass feeding butterflies. The Hesperidae and Satyridae (Browns) are obviously present along with many Lycaenidae that feed on the small leguminous plants that are within the grass. Many Pieridae are also seen but often it would appear, island hopping across the savannah between areas of more dense vegetation.

Needless to say the area is a rich region in butterfly and moth diversity. Aspects of phenology and disturbed habitats will provide us also with some in-depth knowledge of the impact man is having on this diversity. In many instances the presence of man increases diversity. As forest is cleared, succession results in flora more suited to colonising species appearing. With such easily identifiable indicators and with an increased awareness within the communities, the loss of forest and butterfly fauna in that forest will be more easily recorded. The predicted changes due to climate change may well be made clearer following our phenology study.

Development of methods for farming butterflies and production and breeding of pupae

Viability study to determine the potential for the formation of a butterfly farming co-operative

This will be the focus of the MSc project for Mr Hemchandranauth Sambhu (Sambhu) who will do a socio-economic study of the feasibility of developing a butterfly farming business for the communities.

Community involvement

Our contact with the communities is a priority and our target is to reach all the communities and to give them an opportunity to play a part in the project. On our first visit in July we visited six of the 16 communities to introduce the project (Kwatamang, Rupertee, Annai Central, Wowetta, Aranaputa and Fairview). Positive feedback was received, in addition to a little scepticism as a result of previous NTFP initiatives where expectations were not realised. Local communities have the most important part to play in the success of this project and most of the communities have now been made aware of the project and its goals via outreach activities by the team and the outreach staff from Iwokrama. Sambhu and the team are visiting different communities each month and are keeping them updated with our progress and are receiving feedback on their interest in butterfly farming and training. The first demonstration butterfly farm will be established at Fairview for training. We have been given the use of community land for this purpose by Fairview.

An additional bonus has been the involvement of the Wildlife clubs, which target children and young people. Iwokrama, in partnership with the NRDDB, has facilitated the development of 14 youth Wildlife Clubs. These clubs with members from as young as 8 years old, expose local youth to natural resource management, organisational and governance issues and provide a vehicle for the discussion of environmental and other issues. The outreach co-ordinator from Iwokrama International Centre, Samantha James together with Verley Jakobus and Ryan

Roberts (team members) has been actively raising awareness of the butterfly project with the Wildlife Clubs. Verley and Ryan were able to visit four clubs (Yupukari, Kwamitta, Masara and Yakarinta) in the North Rupununi along with wetland team members in January 2007. All were interested in the project and are willing to learn more about butterflies. In addition, they discussed the project with the community leaders (Toushos) who were also interested. In addition, in the recent months the outreach team, lead by Samantha, has visited Aranaputa, Surama and Fairview to involve the children butterfly catching. Using homemade butterfly nets the clubs will continue to collect butterfly specimens, which will be of interest to both the project and the young people who will develop an appreciation for the diversity of butterflies in their environment and the need to maintain their food plants. These may be a reservoir for potential butterfly farmers.

Sambhu and the butterfly team are visiting different communities each month and are keeping them updated with our progress and will receive feedback on their interest in butterfly farming via a survey. The results will be collated by Sambhu to inform him about the feasibility and also the business plan.

Butterfly farming

Based on existing knowledge of butterfly host plant data we have been able to identify many of the plant families expected to be important for the butterfly farming component of the project. We have also identified at least 10 abundant, easily farmed butterfly species with a known value to European displays and exhibitions which would generate income to the communities.

Morpho species

At least three Morpho species have been seen in abundance; *Morpho meneleus*, *Morpho deidamia* and *Morpho helenor*. Specimens have already been collected of male *M. meneleus* for the biodiversity study. At this point the larval host plant for any of the native Morpho species is not specifically known and it is a priority for team members to discover this. In time we are sure to achieve this. In captive breeding work we have shown that Morpho females will readily oviposit on a large number of alternative host plants and we will be able to exploit this in the future but identifying their actual hosts within Guyana will be an important milestone. Morpho butterflies are possibly the most valuable farmed butterfly and so considerable effort is ongoing to achieve this.

Morpho host plants are mainly from the Leguminosae and we have seen an abundance of trees from this family in the forest. Inga, Pterocarpus and Platymiscium are present and are documented in the literature as host plants. With help from experts at Kew and within the community and the Iwokrama network we will endeavour to identify as many host plants as possible.

Heliconius species

Heliconius are present in abundance and are known to only feed on Passifloraceae. Many species are monophagous on specific Passiflora species and this gives us an opportunity to segregate some 'difficult to identify' heliconiid species by their host plant preference. To date we have collected; *Agraulis vanillae*; *Dryas Julia*; *Dione sp.*; *Dryadula phaetusa.*; *Heliconius erato*; *Heliconius sara*; *Heliconius white stripe*; *Heliconius melpomene*; *Philaethria dido* and *Euides sp.*

Butterfly Host Plants

We have collected and started to propagate the following Passiflora; *Passiflora coccinea*, *Passiflora sp (trifasciata?)*; *Passiflora biflora*; *Passiflora foetida*; *Passiflora auriculata*; *Passiflora sp. (glandulosa?)* and *Passiflora species unidentified*.

A small plot at Iwokrama field station has been prepared as a Passiflora propagation area. We have planted and prepared a small nursery with several plants and cuttings of each of the above collected passiflora. We will use these plants for identification, host plant propagation material and for expansion of the project in the future. The Passiflora is a fast growing plant and

with proper maintenance can be utilised for butterfly farming in a very easy way. Our training will develop this as the butterfly farming component develops.

Other Species

Other species of interest for farming include a number of Swallowtail species. These feed on Rutaceae and Aristolochiaceae, of which there are many of both in all sites we have visited. The larvae of one particular butterfly species of interest, *Papilio thoas*, feeds solely on Piper species (Pepper). We will propagate this plant also since the adult butterfly has been seen and collected on several occasions.

The large Owl butterflies (*Caligo sp.*) are very popular in exhibits in Europe and USA and are relatively easy to rear in captivity. The larval host plants are all members of the Musaceae and so we will ensure that large tracts of Banana, Plantain, Heliconia, Strelitzia, Ginger and other monocots are prepared.

In addition, we will farm some of the Pieridae (Whites and Sulphur butterflies) and other species seen on a seasonal basis and will propagate and expand such plants as Cassia, Cecropia and a number of other abundant forest plants.

H Sambhu from the Iwokrama International Centre was actively involved with the project from the start in July 2006, as a member of the Iwokrama staff and was later taken on as an MSc student on the project. He made a valuable contribution to getting this project off the ground because of his experience on the DI Wetland project. We are very pleased with the team structure and the team's enthusiasm, as well as the positive way this project has been received by some of the communities and wildlife clubs. Fairview in particular has embraced this project and the possibility of becoming butterfly farmers, volunteering land and assistance with the first butterfly farm.

Development of methods for farming butterflies

A butterfly farming site has been identified at Fairview and is now cleared and the farm under construction. The site is enclosed on all sides and covers an area of approximately 1 acre. On one side is the main road separated by a strip of forest and on the other Fairview village. The site is ideal in a number of ways.

It is provided and supported by the people of Fairview.

It has water available and does not flood during the wet season.

Fairview has been identified even at this early stage as having many butterfly species present.

The road and new airstrip will ensure good transport links for tourists and butterfly shipping.

It is near to Iwokrama field station.

We will complete the initial butterfly cage structure in 2007. The ground has been cleared using fire and a lot of hard work by the team and volunteers from Fairview! Materials to make wooden frames will be purchased from the Fairview community.

In addition to feeding caterpillars we also need to propagate large numbers of nectar plants for the adult butterflies for those species that are not fruit or dung feeders. *Lantana camara* is a good nectar plant and is always present in jungle regions and grows prolifically. The border of the farm site will consist of *Lantana* hedging. This will ensure we are always attracting butterflies to the area and we will also have a plentiful supply of nectar food plant. We have also seen *Hibiscus* which are much loved by the Swallowtail butterflies and *Psiguria* which are preciously guarded by *Heliconius* butterflies. With each visit we will develop the farming program by introducing newly found plants to the program.

Plant propagation training has been provided for vines that we plan to use. We will record and develop an ongoing system of mass production of such material. In addition, we will reveal any difficult-to-culture plants. We will gain considerable experience of plant and insect care, which will ultimately be continued by a group of key individuals.

Production and distribution of handbook about local butterfly species.

The adult and other developmental stages will be photographed for the butterfly handbook. Host plants will also be photographed and samples sent to Kew for identification if necessary. Details of life cycle stages and host plants together with seasonal occurrence will be recorded for each species where possible. The Lepidoptera collection at CSBD will act as a useful reference source although no details of host plants or larval stages are recorded on the database.

Central Species List

Activities to achieve this are in progress.

Changes in the project implementation timetable

The MSc students and other members of the team did not start until November 2006 and will result in a delay in any outputs dependent to the MSc students e.g. completion of the two year field survey report and socioeconomic report will now be January 2009, The students will complete their MSc research in November 2008.

The activities have been carried in the sequence according to the logframe. However, there was a delay before the team was up and running. In addition, we did not allow time for site selection and the local manufacture of bait traps for the butterfly survey.

3.2 Progress towards Project Outputs – mention output v indicators and whether output level assumptions hold true

Biodiversity and monitoring programme established and functioning through collaboration of two institutions.

A team of six consisting of Two MSc students, two local Amerindians and two rangers has received training to equip them to efficiently carry out butterfly surveys, prepare butterfly specimens and propagate butterfly host plants. The training will be ongoing throughout the project and will be extended to involve interested community members. The MSc students will benefit from being registered at the University of Warwick with support services and MSc committees consisting of experienced research staff with relevant experience in field research and business development. Computers, digital cameras and a comprehensive collection of butterfly books have been provided for the team. Young people will receive training via the Wildlife clubs. The MSc students are committed to staying with their Institutions after the project terminates and will provide a training resource. Young community members with aspirations have a tendency to leave the village for a few years but generally return to build their lives in the community.

Production and distribution of handbook about local butterfly species.

The butterfly manuals are embryonic but a publisher has been identified and a library of photographs is being assembled in readiness. Butterfly eggs are being collected from captured females with their host plant to record information on lifecycle stages. The production of the manuals will be delayed only because of the late start.

Development of methods for farming butterflies.

The manuals will be produced following the surveys and development and refinement of farming methods. The first butterfly farm is in progress and a passiflora garden has been set up.

Trial of butterfly farming techniques by local farmers.

The passiflora garden at Iwokrama will provide food for Heliconius butterflies. Similar host plant gardens with a wider range of host plants and nectar plants are being set up at the first trail

farm site at Fairview. The large netted cage is under construction. The Fairview community will be involved in the farm. We have identified at least 10 farmable butterflies that we are confident can be sustainably produced. Some of these have been farmed at Warwick University.

Production and breeding pupae methods.

This has yet to start but all the components will be in place in the very near future.

Central species list established.

This in progress. The butterfly collections at the CSBD have been assessed and some were found to be in a poor condition. A new collection will be set up for this project and made available the website. A catalogue of existing collections at CSBD will be added to the website.

3.3 Standard Output Measures

Table 1

| Code No. | Description | Year 1 Total | Year 2 Total | Year 3 Total |
|-------------------|---|-----------------|-----------------|-----------------|
| Established codes | | | | |
| 2 | Two students from Guyana will attain a Masters qualification from the University of Warwick following two years research in Guyana | 0 | | |
| 5 | Six trainees will gain at least one year of training in biodiversity and socioeconomic studies and accreditation for completing Iwokrama Personnel Development Programme. | 0 | | |
| 6A | Five members of the local community in Guyana will be given training in planting host plants and the identification and breeding of butterflies. | 0 | | |
| 7 | Database will be produced to record species. This can be updated and utilised by Iwokrama following project completion. | 0 | | |
| 7 | Handbook production will allow future identification. | 0 | | |
| 8 | The four UK project staff will spend a total of 30 weeks in Guyana between them in 3 years | 0 | | |
| 9 | A species management plan is to be produced for this region for butterfly species and host plants. | 0 | | |
| 10 | One handbook will be produced of butterfly and host plant species in the region and detailing methods of butterfly breeding. This will assist future work related to species identification, classification, recording and breeding of butterflies. | 0 | | |
| 11B | A paper will be submitted to a peer reviewed journal if a new species is identified. | 0 | | |

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| 12A | One database will be established to record butterfly species and host plants in the region. This database will consist of illustrative and written data. This database will be handed over to Iwokrama following project completion. | 0 | | |
| 13A | Two collections will be deposited at the University of Guyana. The butterfly host plant species will be deposited in the in-country herbarium for future reference. Butterflies (male and female) specimens will be deposited at the CSBD for future reference. New species will also be deposited at the CSBD (and NHM and the Smithsonian Institute if available). | 0 | | |
| 13B | The CSBD reference collection at the University of Guyana for butterflies and plants to be enhanced. | 0 | | |
| 14A | Four seminars will be organised (two per year in year 2 and 3) to disseminate findings of both surveys. Two seminars will be held at the Iwokrama field station for the local communities and two will be held at the Iwokrama head office, Georgetown/University of Guyana. | 0 | | |
| 15B | One local press release will be made following the production of the handbook. | 0 | | |
| 16A,B&C | A minimum of three articles will be submitted to the Iwokrama press room for publication in their quarterly newsletter. | 0 | | |
| 20 | The two laptops, digital cameras and printers will remain with Iwokrama following the completion of the project. Estimated value of £4000. | 0 | | |
| 22 | Number of field plots established and netted cages | 1 | | |
| 23 | Value of resources raised from other sources (i.e. in addition to Darwin funding) for project. | | | |
| New - Project specific measures | | | | |

Table 2 Publications

| Type * | Detail | Publishers | Available from | Cost £ |
|----------------------------|-----------------------|--------------|-------------------------------|--------|
| (eg journals, manual, CDs) | (title, author, year) | (name, city) | (eg contact address, website) | |

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| Posters | Butterfly farming at Iwokrama, Guyana | | Guyanabutterflies.com | |
| University of Warwick Website | Butterfly Farming to help save rainforest Article and press release University of Warwick | | http://www2.warwick.ac.uk/newsandevents/pressreleases/NE100000209270/ | |
| Physorg.com | Butterfly Farming to help save the rainforest | | | |
| University of Warwick | Butterfly Farming to help save the rainforest 14/06/06 | | Podcast | |
| New Agriculturist | News Brief 06-4 Butterfly | | | |
| Terradaily | Farming to help save the rainforest | | | |
| 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 | | | |
| Stratford upon Avon Herald | 19/06/06 Butterfly Farming to help save the rainforest 15/06/06 | | | |

3.4 Progress towards the project purpose and outcomes

In the last 9 months we have made a good start towards achieving the outcomes for the project purpose. In preliminary surveys we have collected some butterflies that we still have to taxonomically identify, across the butterfly families. These will be identified with the aid of books and if necessary with the help of the Natural History Museum or the Smithsonian Institute. In only two surveys without bait traps we identified over 100 species of butterflies. Monthly butterfly surveys will take place in different zones using butterfly netting and baited traps for at least a year to examine the seasonality of different butterfly species. We have established transects and are making good progress. Results of monthly surveys will be placed on the website. We have identified at least 10 butterflies for sustainable farming which will have a high value in Europe. The project has been publicised on TV and in the local newspapers and Warwick University magazine in the UK and via a poster, powerpoint presentations and visits to the communities, wildlife clubs, EPA, Wildlife Division and the British High Commission in

Guyana. Materials are being collected for the butterfly handbook and butterfly farming, our first butterfly farm is being constructed and a passiflora garden has been established.

To date the purpose level assumptions hold true and the indicators are adequate towards measuring outcomes

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

- A. Biodiversity study on butterflies will provide information on butterflies and their host plants. Some indicator butterfly species can be used to evaluate the impact of the logging on biodiversity and may inform on which host plants must be conserved to maintain the butterfly diversity. Butterfly farming has been shown to benefit biodiversity in other countries and is important in protecting rare and endangered species.
- B. The communities in the target areas were unaware of the wealth of biodiversity of their butterflies and the negative impact of human activities and development of other "sustainable" livelihoods on butterfly populations. Butterflies have an important part to play in ecotourism and they is an interest in butterfly trails.
- C. In the past rare butterflies have been collected by visitors with the help of local people who did not appreciate the value of their butterflies. Communities are now being educated in this project to appreciate and value butterflies as a precious resource which can be exploited in a sustainable way by farming.

4. Monitoring, evaluation and lessons

The UK team has visited Guyana three times since the start of the project. The first visit focused on the recruitment of the team and to discuss the project with Iwokrama, the University of Guyana, the CSBD, NRDDDB, some communities, EPA, the Wildlife Division. The project was implemented on the second visit and training was given to the team on the second and third visits. We have received regular reports from the team and the MSc students have submitted a 7 week MSc report to the University of Warwick describing their project and project plan. The progress of the students will be monitored by their supervisor from Warwick Dr Doreen Winstanley and the MSc committee established for each student at Warwick. The University of Guyana will receive copies of their reports and will provide some additional guidance. The students will make a presentation at the University of Warwick and Guyana and will also give presentations to interested organisations e.g. EPA and the Wildlife Division.

The students will submit an annual report, the first in November 2007. Copies of annual and final reports will be distributed to Iwokrama, CSBD, the University of Guyana, libraries and to the NRDDDB. The report will also be reported on the website.

Monthly visits will continue to be made to different communities to assess their interest in the project and their desire for involvement and to listen to feedback whether positive or negative. A survey will be carried out within the communities.

All the outputs and outcomes directly contribute towards the purpose of the project namely to increase knowledge of butterfly biodiversity and to sustainably exploit these populations within the Iwokrama forest and surrounding areas. This will be demonstrated by carrying out a butterfly survey in six different zones on a monthly basis to get an indication of species occurrence, abundance, seasonality, habitat preference, host plant preference and identification of life cycle stages. The indicator will be a butterfly manual which can be used by guides and visitors for ecotourism and as a reference source for butterfly farming. If successful the butterfly guide may be popular in local shops. The reference species will be entered onto a database as photographs and related text and deposited the CSBD in Guyana and will be accessible via our website. This can be measured in terms of the quality of the collection, practical uptake and use of the handbook by the local communities, academics and visitors. A practical manual on butterfly farming will provide a valuable tool for interested potential farmers in the communities and in other countries. This will be measured by assessing how useful it is to the trainer farmers in the first instance. The value of trial of butterfly farming and the use of a demonstration farm for training can only be measured by the uptake, success and longevity of butterfly farming in the region. The demonstration butterfly farm at Fairview will have a dual purpose and will be used as an attraction for tourists. This can be measured by the number of visitors passing through. A provisional business plan will be developed by one of the MSc

students with help of the NRDDDB, communities, Iwokrama and from his MSc Committee at Warwick who have MBAs.

What lessons have you learned from this years work?

The team has drawn up a very challenging schedule for monthly surveying of butterflies and visiting the communities which is made harder by the two rainy seasons. The two team members live in Georgetown and they can be in the forest and surrounds for up to 15 days per month. On their return home they have to process data and specimens e.g. butterflies from the collecting and write surveys, handbooks and reports and stay in touch with the remaining members of the team. As a result we have reduced the actual butterfly collection to one continuous year, weather permitting.

We have become increasing aware that the involvement of interested communities and their expectations have to be handled carefully e.g. some areas are more practical than others e.g. transport links, and local climate etc. A business plan has to realistic if the butterfly business is to succeed and at the same time has to try and address the interests of individual interested communities. This may be the rate limiting step for a successful business and this probably will be addressed after the project has terminated.

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

Not applicable.

6. Other comments on progress not covered elsewhere

This project requires dedicated transport for 6-8 persons for at least 15 days a month in the target region. High usage of the vehicles based at the Iwokrama Field Station was making this project impracticable. The cost of hiring vehicles and drivers was high and therefore the solution was to purchase a vehicle for the project which could also be used by the other Darwin project. I have been in communication with Margaret Okot regarding this matter.

With the help of the accountants and the University we are be able to purchase a second-hand vehicle without any additional cost to the project. This will be available for the lifespan of the project.

7. Sustainability

As described in this report the team has been very active in involving all groups and organisations pivotal to the success of the project. The project has been actively promoted in-country by all members of the team and through the Iwokrama outreach programme via the wildlife clubs. The evidence of increasing interest is already visible in the region e.g. children with butterfly nets and dressed as butterflies at the wildlife festival this year. A visible structure is in construction at Fairview for butterfly farming. Villagers are taking part in projects such as making butterfly traps and nets. Communities are very co-operative and very interested. Essential resources such as specialised butterfly books, computers and digital cameras have been provided and some books will be placed in the library at Iwokrama Field Station. A team of six are acquiring knowledge and skills and members of Fairview (in the first instance) will take part in establishing the first farm. The reference butterfly collection at the CSBD will be expanded and published on the website. A butterfly handbook will be important for ecotourism, enthusiasts and to support butterfly farming. Knowledge of butterfly farming will be supported by a butterfly farming manual. A business plan will form the basis of a butterfly industry in the region.

8. Dissemination

Members of the team in Guyana and in the UK have interacted directly with the NRDDDB, Iwokrama International Centre, Iwokrama Forest Field Station, University of Guyana, CSBD, EPA, the Wildlife Division, the target community councils or community groups, the community wildlife clubs and the British High Commission. This has been mainly through team visits to the communities, presentation of a poster at the heritage month celebrations at Annai in 2006, and a powerpoint presentation to the NRDDDB. The two MSc students together with the two UK members and Dr Raquel Thomas and our consultant Dr Katharine Payne have been to at least one of the three visits to EPA, the Wildlife Division. The project was advertised on local radio.

Details of these activities are in this report. Dissemination activities will be ongoing when the community training programme starts

Even before the project is completed and the team will have received sufficient training and experience to take part in dissemination activities e.g. using the demonstration farm, and training courses via Iwokrama International Centre, Bina Hill Institute and the NRDDDB and will have facilitated several pilot farms. The butterfly manual and a butterfly farming manual will be vital in disseminating vital information to potential butterfly farmers and butterfly guides. No direct funding is available for these activities but could be facilitated by follow on funding for Darwin to ensure the business is taken up and interest maintained during the critical first year of business. The indicator will be a butterfly manual which can be used by guides and visitors for ecotourism and as a reference source for butterfly farming. The reference species will be entered onto a database as photographs and related text and deposited the CSBD in Guyana and will be accessible via our website. This can be measured in terms of the quality of the collection, practical uptake and use of the handbook. A practical manual on butterfly farming will provide a valuable tool for interested potential farmers in the communities and in other countries. This will be measured by assessing how useful it is to the trainer farmers in the first instance. The value of trial butterfly farming and the use of a demonstration farm for training can only be measured by the uptake, success and longevity of butterfly farming in the region. The demonstration butterfly farm at Fairview will have a dual purpose and will be used as an attraction for tourists. A provisional business plan will be developed by one of the MSc students with help of the NRDDDB, communities, Iwokrama and from his MSc Committee at Warwick.

Publicity Material

The project was publicised on BBC West Midlands news in the UK and on the radio in Iwokrama and the North Rupununi district. The University of Warwick publicised the project in their magazine "Communicate" and on the University intranet. An online database of Guyanese butterflies collected in this project will be made available on the website www.guyanabutterflies.com. Project reports will also be posted on the website, which will also have links to other relevant sites e.g. the DI Wetland Project

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[I agree for ECTF and the Darwin Secretariat to publish the content of this section](#)

The interest and enthusiasm from all age groups in the community for the butterfly project in Guyana was greater than anticipated. Some of the older members of the communities were knowledgeable about the butterflies and their caterpillar host plants or had first hand experience of lepidopteran pests of their crops. Understanding the lifecycle and behaviour of lepidopteran pests will help them in controlling these pests. One of the communities, Fairview, on the edge of the Iwokrama Rain Forest Reserve willingly made land available to develop a pilot /demonstration farm. They helped to clear the site and will provide materials for its construction. Pilot farms will also be developed in other communities with their co-operation. An unexpected bonus has been the involvement of the wildlife clubs from communities encouraged principally by Samantha James and Verley Jackobus. The children are extremely enthusiastic and will learn about butterfly development and identification. These children will provide the interest to maintain future butterfly farming or conservation in their region. The Iwokrama forest and North Rupununi district have a rich diversity of butterflies, many of which will have a high retail value for the butterfly houses of UK and the USA. We have identified at least 10 abundant, easily farmed butterfly species with a known value to European displays and exhibitions, which could generate income for the communities

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

| Project summary | Measurable Indicators | Progress and Achievements April 2006 - March 2007 | Actions required/planned for next period |
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| <p>Goal: To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but poor in resources to achieve</p> <ul style="list-style-type: none"> the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising out of the utilisation of genetic resources | | <p>The biodiversity study on butterflies has started. This study will provide information on butterflies and their specific host plants and will act as indicator species for the evaluation of the environmental impact of human activities e.g. logging and global warming. It is envisioned that butterflies will be conserved by butterfly farming and provide a sustainable income for the indigenous communities.</p> | <p><i>(do not fill not applicable)</i></p> |
| <p>Output 1. 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>A training course was conducted in November 2006 for the MSc students and the community representatives. This was later than planned due to delays in signing the Darwin contract and the time required to advertise and select candidates for the six team members. Further training in biodiversity assessment techniques and butterfly identification was given in March 2007 partly for the benefit of the rangers who started just after the first training. Training in IT skills will be delivered by the Bina Hill Institute for the community representatives and rangers. Young people are receiving butterfly knowledge and practical training via the wildlife clubs. The indicators are reasonable except that the date for workshops within the community will be delayed until November due to the late start.</p> | |
| <p>Output 2. Production and distribution of handbook about local butterfly species.</p> | <p>Manual peer reviewed and publication date established. 20 + copies to be distributed by midway through year 3.</p> | <p>The publication date for the manual will be delayed due to the late start. Digital cameras, including an SLR digital camera and computers have been provided to the students and community workers and rangers to enable them to save camera ready digital images of butterflies and life cycles and to add text. The indicators are satisfactory but the time frame has shifted.</p> | |
| <p>Output 3. Development of methods for farming butterflies.</p> | <p>Manual produced on best farming methods in collaboration with local communities. 20+ copies to be</p> | <p>Protocols are being developed for propagating plants as butterfly host plants and for butterfly farming. So far practical training has been given on passiflora propagation.</p> | |

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| | distributed by midway through year 3. | The indicators are satisfactory but the time frame has shifted. |
| Output 4. Trial of butterfly farming techniques by local farmers. | Allocation of trial farming areas. | One site has been provided by Fairview for the purpose of butterfly farming. The land has been cleared with the help of the Fairview community and butterfly team and plans prepared to construct a large netted butterfly house and a nursery for butterfly host plants. |
| Output 5. Production and breeding pupae methods. | Netting of first egg batch for all pupae to develop. Production of first set of pupae. | Scheduled for June 2007 |
| Output 6. Central species list established. | Collection of sample species from forest (male and female species and host plants) and preparation for deposit. | We have collected a large number of butterfly species using nets and we anticipate that this will increase with the additional use of baited traps. |
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Annex 2

| Project summary | Measurable Indicators | Means of verification | Important Assumptions |
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| <p>Goal:</p> <p>To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but poor in resources to achieve</p> <ul style="list-style-type: none"> the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising out of the utilisation of genetic resources | | | |
| <p>Purpose</p> <p>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> |

| Outputs | | | |
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| Biodiversity and monitoring programme established and functioning through collaboration of two institutions. | 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. | Database established on butterfly biodiversity data (written and illustrative data) including information on stages of development. Field survey reports. | Trained staff remains within the institution and / or University and train others to use the skills gained. |
| Production and distribution of handbook about local butterfly species. | Manual peer reviewed and publication date established. 20 + copies to be distributed before the end of year 3. | Comments received from peer review panel. 2 copies sent to Darwin Initiative. | N/A. |
| Development of methods for farming butterflies. | Manual peer reviewed and publication date established. 20 + copies to be distributed by midway through year 3. | Comments received from peer review panel. 2 copies sent to Darwin Initiative. | Biodiversity data supports the viability of a sustainable butterfly farming business. |
| Trial of butterfly farming techniques by local farmers. | Allocation of trial farming areas. | Records of all village meetings and workshops attended. Host plant species sown / transplanted onto plot. | Continued support, co-operation and participation from local populations. Continued Government support for sustainable development. |
| Production and breeding pupae methods. | Netting of first egg batch for all pupae to develop. Production of first set of pupae. | Production of first set of pupae. | Host butterfly species able to develop into pupae within determined plot area. No disease outbreaks. |

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| <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> | <p>NA</p> |
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Proposed amendments in red

