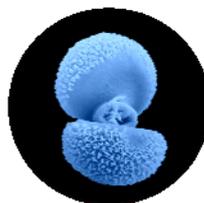
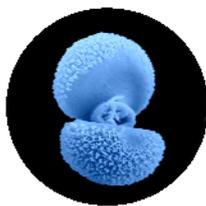


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Insect Biodiversity: Taxonomic Capacity Building in Guyana

Oliver Cheesman





Darwin Initiative for the Survival of Species

Final Report

Insect Biodiversity: Taxonomic Capacity Building in Guyana

Darwin Initiative project no. 162/07/091

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Darwin Initiative for the Survival of Species

Final Report

1. Darwin Project Information

Project title	Insect Biodiversity: Taxonomic Capacity Building in Guyana
Country	Guyana
Contractor	CABI Bioscience
Project Reference No.	162/07/091
Grant Value	GB£76384
Starting/Finishing dates	October 1998/October 2000 (extended to April/May 2001)

2. Project Background/Rationale

This project was based in Guyana, and provided for the running of two training courses in Insect Biodiversity at the local university. Guyana is very rich in biodiversity, particularly that associated with the substantial area of tropical forest that dominates the inland part of the country. However, it lacks local capacity to identify, and effectively conserve or utilise, these natural resources. Notwithstanding this, Guyana has been remarkably forward-looking in recognising the value (and need for conservation) of its biota. This attitude is exemplified by the establishment of the Iwokrama International Centre for Rain Forest Conservation and Development, under which the Government of Guyana set aside 3600km² of the country's forest to be managed for conservation, research and sustainable development by the international community.

As in many parts of the world, the lack of local capacity to identify, conserve and sustainably utilise biodiversity in Guyana applies particularly to small-bodied organisms (such as insects) that make up the vast majority of terrestrial biodiversity, and contribute so much to ecosystem function. This project was intended to enhance local capacity in entomology, thus raising awareness of the importance of insects and their conservation, and underpinning initiatives such as Iwokrama. This capacity building operated at the level of the individual (training course participants), and the institution (University of Guyana) through transfer of knowledge and physical assets to facilitate further, locally-led participation in entomological training and research.

The need for the project was identified by Professor Valerie Brown, the original PI on the project. Professor Brown had previously been involved with DFID (ODA) research (and an earlier Darwin Initiative project - 162/4/130), in Guyana, and had become aware of the need for this project through those activities. Entomological expertise are in short supply in Guyana, despite their direct relevance to the agricultural and forestry sectors, as well as their vital role in identifying and conserving Guyana's biodiversity.

The University of Guyana is the only university in the country and, as such, is Guyana's foremost institution of higher education. It also hosts the Centre for the Study of Biological Diversity (in collaboration with the Smithsonian Institution, see <http://www.sdn.org.gy/csbd/>), Guyana's national herbarium, and a further important repository for animal specimens (the University Zoology Museum). The Environmental Protection Agency, a government body

responsible for enforcing much of the 1996 Environmental Protection Act, including biodiversity related provisions, also operates from the University of Guyana campus (see <http://www.sdn.org.gy/epa/>). The University Faculty of Natural Sciences is directly involved in a number of biodiversity related activities in Guyana, particularly through the Dean, John Caesar (senior local co-ordinator for this project).

3. Project Summary

Project Purpose: To provide biodiversity capacity building in the world's most diverse group of organisms, the insects.

Project Objectives: To assist local capacity building in entomology; to provide an introductory course on taxonomy and ecology in insect biodiversity; to demonstrate by fieldwork the wealth of Guyana's biodiversity to younger generation and older 'professionals'; to train in specimen collection, preparation, storage and inventory; to contribute specimens and knowledge to Guyana's national insect collection; to develop local capability for involvement in international initiatives.

As a surrogate logical framework, a copy of the project outputs and implementation timetable, as agreed under the Project Schedule (including amendments notified in previous reports) is attached (Appendix V).

All major aspects of the original objectives and operational plan were maintained throughout the implementation of the project, subject to the following modifications (see also previous reports):

Purchase of stereomicroscopes [see e-mail from Valerie Brown to Valerie Richardson (DI) 7/5/99, and previous reports]

It had originally been anticipated that the University of Guyana would be able to provide at least a proportion of the microscopes necessary for the training courses, and/or that small numbers of microscopes could be borrowed from local/regional institutions. As a contingency plan, it had been suggested that this equipment could be provided "on loan" from sources in the UK, at least for the duration of the courses.

In the event, almost no suitable apparatus could be sourced locally, and it was considered impractical to ship a full set of microscopes to Guyana and back on two separate occasions. Consequently, it was decided to purchase a number of (very reasonably priced) stereomicroscopes, as part of the package of physical assets to be transferred to the University of Guyana under the project. Although this unanticipated cost did not seriously compromise the purchase of other essential equipment, it did place an additional strain on the finances of the project. However, the stereomicroscopes have proven to be one of the most valuable (physical asset) contributions to institutional capacity building made by the project.

Staff changes [see letter from Valerie Brown to Valerie Richardson (DI) 13/4/99, letter from Oliver Cheesman to Valerie Richardson (DI) 6/3/01, previous reports and additional points below]

A number of changes were made to the staffing of the project as outlined in the original project proposal. Yves Basset (original principal taxonomist) left Guyana for a position in Panama, and

was replaced by Roger Booth. Roger Booth subsequently left CABI Bioscience, and had to be “re-recruited” to the project on a consultancy basis. The staff provision in the project proposal was remarkably short of taxonomic specialists, given the emphasis that the proposal placed on insect taxonomy. Consequently, a further taxonomic specialist (Andrew Polaszek) had to be recruited to the project for the second training course. Valerie Brown (original PI) left CABI Bioscience before the implementation of the second training course, and her responsibilities were taken over by Oliver Cheesman (Project Manager). David Hammond’s role as local co-ordinator for the second course was taken over by Elroy Charles. Between the first and second courses, Dindyal Permaul (local co-ordinator) left the University of Guyana to take up the post of Permanent Secretary (Agriculture) in the Guyanese government.

Slippage in implementation timetable [see previous reports and letter from Oliver Cheesman to Valerie Richardson (DI) 6/3/01]

A range of circumstances contributed to delays to the delivery of the planned training courses.

The inability of the original PI to devote as much time as anticipated to the project, and organisational restructuring within CABI Bioscience, resulted in unexpected shifts in responsibility and time allocation of UK project personnel. This shift in responsibility was evident in the early stages of the project (although it may not have been adequately reflected in the Staff Resources section of the Annual Report, April 1999), and only increased over subsequent months. This led to ambiguities arising over accountability, particularly in the decision making process, in relation to this project. Although ultimately overcome, these factors contributed greatly to the challenges associated with managing the project.

It proved more difficult than anticipated to schedule the training courses at a time when University of Guyana facilities, staff and students were available. Because this is the only university in Guyana, higher education activities in the host country are concentrated at this institution. Hence, facilities, staff and students were invariably committed to teaching or examination of the day-to-day University curricula, or to official extra-curricula activities such as special summer schools.

A degree of civil unrest appears to be a fairly regular feature of life in Guyana. Although this rarely results in a severe threat to life and limb, the safety of the project personnel (and course participants) had to be taken into account. Periods of unrest also disrupt customs, transport and communications. It did not prove possible to schedule either course outside a period of unrest. Rioting in Georgetown (during what was, in effect, a general strike) nearly resulted in the declaration of a state of emergency during the 1999 course. More widespread rioting (following a general election) caused disruption to the planning and implementation of the 2001 course.

See also Section 6 and Appendix II for details of variance in specific outputs.

The contribution of the project towards the aims of the Convention on Biological Diversity (CBD) is probably best described with reference to Article 12 (Research and Training). Small contributions were also made relevant to Articles 7, 8, 10 and 13 (see also Appendix I).

The project has successfully met all of the original Project Objectives as given above. Some particular outputs were only partly achieved, but others were enhanced (see Section 6 and Appendix II). Overall, local capacity in entomology was certainly enhanced, through training courses in insect biodiversity delivered to professionals and students. Training included aspects of insect taxonomy (including specimen collection in the field, preparation and handling), ecology, conservation and utilisation. Specimens were contributed to the insect collection of the

Centre for the Study of Biological Diversity (University of Guyana), where information on other holdings was also checked and/or added to by visiting insect taxonomists. Relevant physical assets were transferred to the host country, including entomological equipment and teaching materials. The training and institutional capacity building delivered by the project should facilitate greater local involvement in international initiatives, as planned.

4. Scientific, Training, and Technical Assessment

The project was entirely centred on training/capacity building, with no research work undertaken. The project centred on the delivery of two training courses in Insect Biodiversity, and transfer of physical assets to the University of Guyana to facilitate future teaching in entomology. Capacity for entomological work in Guyana was further enhanced by the provision of specimens and information to the national insect collection (the collection of the Centre for the Study of Biodiversity).

Recruitment of participants on to training courses was largely the responsibility of the University of Guyana collaborators, with the assistance of other local co-ordinators. Promotional material was produced in the UK (example included as Appendix VIII – hard copy only). Participants for the first course were recruited on the basis of the relevance of aspects of entomology to their work (professionals), or their known interest in the subject (students). As the second course was designed to follow on from the first, participants were recruited on the basis of their attendance of the first course, or equivalent existing knowledge of entomology. The participants in the two training courses are listed in Appendix VI. It had been hoped to recruit greater numbers of participants, including some from outside Guyana (from Surinam, for example), but a number of factors mitigated against this (see Section 6).

The contents of each course are summarised in Appendix VII. The first course was designed to give a broad introduction to all aspects of entomology, as well as to the concept of biodiversity and the importance of efforts towards its conservation. The roles of insects in natural and managed ecosystems was stressed, demonstrating the utility value of insect biodiversity, and the particular value of insects as environmental and biodiversity indicators was emphasised. Three field collecting sessions were conducted, in different habitat types. These allowed a wide variety of collecting equipment / techniques to be used by the participants, and provided material for specimen preparation / identification exercises. Identifications were carried out using paper-based and electronic (computer-based) keys. On the basis of these identifications, simple biodiversity data were generated, and used to demonstrate the fundamentals of quantitative analysis of biodiversity data (species richness comparisons, biodiversity indices, indices of similarity, etc). The latter proved more difficult than anticipated, as the mathematical ability of all participants was less than had been expected. The taxonomic component of the first course focused on enabling participants to distinguish between the major orders of insects, and the largest families of Coleoptera (beetles). This group was chosen for particular attention, on the basis that it represents the single most speciose and diverse insect order. The group also provides an excellent model for demonstrating the finer morphological characters that are most useful in insect biosystematics, as well as demonstrating the astonishing range of ecological adaptations that have arisen within a single insect taxon.

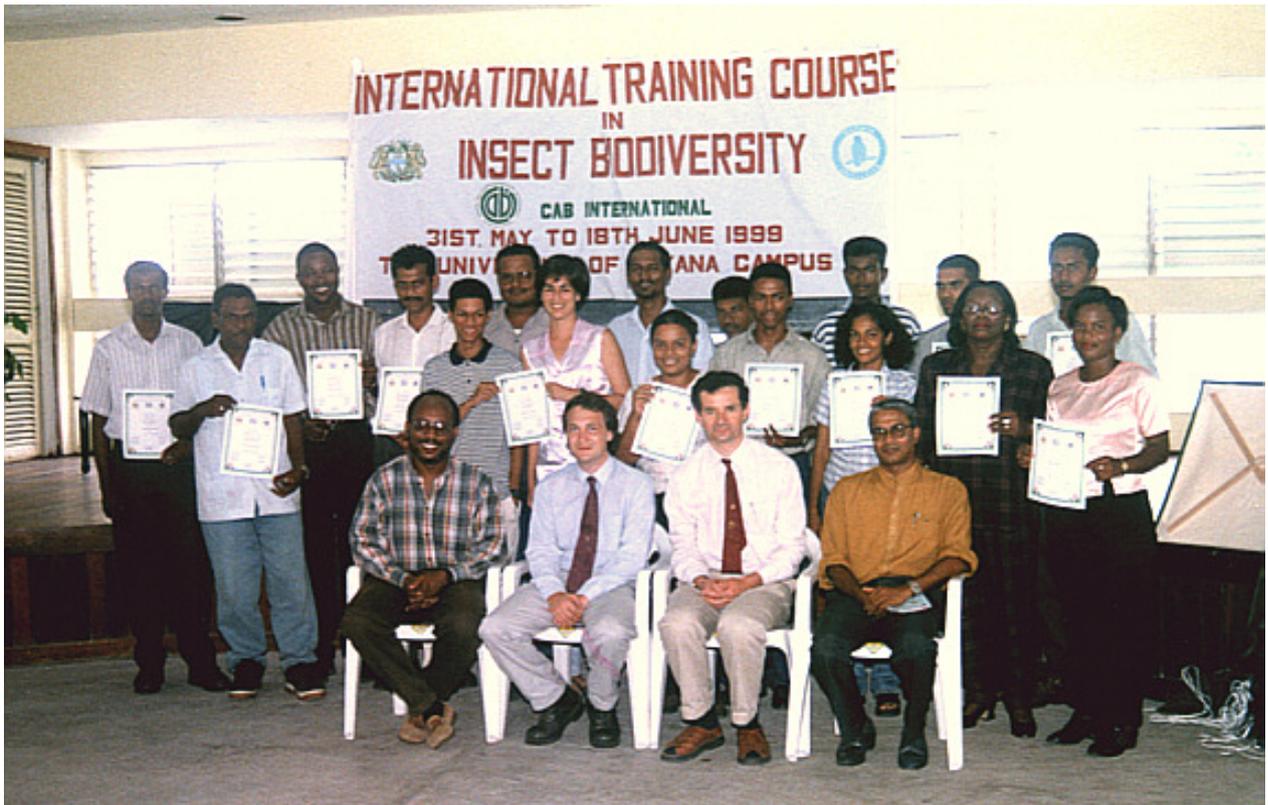
Partly on the basis of feedback from participants in the first training course, the second course provided more detailed information on the utilisation of insect biodiversity. More specific information was provided on issues relating to conservation, including a comparison of approaches in temperate and tropical systems, with consideration of particular initiatives

underway in Guyana. The taxonomic component included a review of insect orders, and more detailed consideration of three economically and ecologically important taxa, the Orthoptera, Hymenoptera and Coleoptera. On this occasion, work on the beetles focused on identification of key taxa *within* those families that are most important as pests and natural enemies. Care was taken to relate this biosystematic work to earlier sessions on utility and conservation of insect biodiversity.

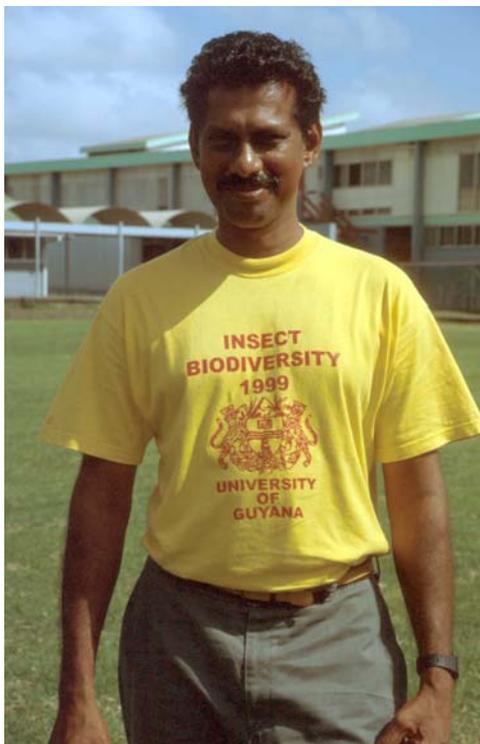
The UK personnel (Drs Oliver Cheesman, Roger Booth, Andrew Polaszek) conducted the majority of the teaching on the two courses, but we were able to draw on regional and local personnel for particular sessions. Vyju Lopez from the CABI Bioscience Caribbean & Latin American Centre (CLARC, Trinidad) contributed a particularly valuable set of lectures and practicals on applied entomology to the second course. Other notable contributions were made by Dr Dindyal Permaul (Faculty of Agriculture, University of Guyana) on the roles of insects in managed ecosystems, and Dr Coralie Simmons (Iwokrama) on Guyanese initiatives towards the conservation and sustainable utilisation of biodiversity. The Centre for the Study of Biological Diversity was much used as a source of demonstration materials, and as an example of a working insect collection, and we are grateful for the support of Mr Mike Tamessar, the manager of this facility. Throughout both courses, it proved very valuable to draw on the experiences of the participants themselves, a number of whom were involved in particular aspects of entomological work through their respective professions.

The two courses conducted under this project were (as with most training conducted by CABI Bioscience) treated very much as professional development exercises based on a participatory approach rather than higher education courses. As such, formal assessment of participants through (for example) examination was not considered appropriate. Instead, their progress was continually monitored by the trainers, and all proved to be co-operative, dedicated and able. Certificates (signed by UK personnel and senior representatives of the University of Guyana) were issued to participants who were felt to have completed the course successfully, having demonstrated in practical exercises and discussions the knowledge and skills they had acquired.

The second course culminated in a participants-led workshop session, attended by the UK project personnel, representatives of Iwokrama, the University Faculty of Natural Sciences and the Centre for the Study of Biological Diversity. In this session (“The Future of Entomology in Guyana”), practical options were explored for future activities through which the course participants could apply and develop their entomological skills and knowledge. Means by which a wider network of interested parties might be formed and consolidated were also discussed. Amongst other co-operative resolutions, this session saw the first steps taken towards an Entomological Society of Guyana (see below).



Course participants with UK and University of Guyana project personnel at the closing ceremony of the 1999 training course. (Photograph: University of Guyana).



“Commemorative” T-shirts were produced for both training courses – Ahnand Rajkumar models the 1999 version. (Photographs: O. Cheesman).



Course participants were introduced to a range of methods for collecting insect specimens in the field. Roger Booth demonstrates the use of a Malaise trap (above), and participants practise with beating trays and sweep nets (left). (Photographs: O. Cheesman).



Course participants were also trained in methods for preparing, examining and identifying insect specimens in the lab. Working through identification keys in the course training manual (above); Vyju Lopez and course participants examine leaf damage caused by insects (below). (Photographs: O. Cheesman).





As well as traditional paper-based keys for insect identification, computer-based identification aids were demonstrated (above), and donated to the University. Some of the insect specimens brought from the UK, authoritatively identified by international experts and used on the courses (below, left) were later integrated into the insect collection of the Centre for the Study of Biological Diversity (below, right). (Photographs: O. Cheesman).



5. Project Impacts

Evidence that project achievements have led to the accomplishment of the project purpose should be clear from information given throughout this report. Two particular examples are also described here of where the project has had an impact beyond the specific provisions of the proposal/Project Schedule.

A month after the first (1999) training course, two of the participants from GUYSUCO (Ahmand Rajkumar and Dewendra Kumar) organised their own training exercise in Insect Biodiversity. This drew on materials provided to them under the project, and resulted in a one-day course delivered to 22 of their colleagues (see Appendix XI). Although “secondary training” was an aspiration of the project, no time or resources were available for project personnel to directly participate in such activities. Full credit must be given to the enthusiasm and dedication of the two individuals involved, for organising and delivering this training exercise.

Although it was recognised that an informal network of entomologists would be formed by the bringing-together of students and professionals under this project, no formal means of consolidating this was provided for. The workshop session of the 2001 course explored such issues, and the participants proposed the formation of an Entomological Society of Guyana. The future of this initiative depends on the enthusiasm and commitment of the instigators, however, I was happy to approve the payment of a small sum from the remaining project funds to facilitate this. The initiative also attracted the support of the Vice Chancellor of the University when it was announced during the closing ceremony of the training course. To date, at least three subsequent meetings have been held in Guyana, bringing together the course participants and others with a professional or other interest in entomology. These have discussed (for example) the development of a formal constitution for the society, as well as logistic issues relating to its future operations.

In relation to assisting Guyana to meet its obligations under the CBD, this project’s greatest contribution is in increasing the capacity of the country to participate in a range of activities relating to the identification, conservation and utilisation of insect biodiversity. As well as equipping the local university for further entomological training and research, a body of students and professionals has been trained in entomology (and biodiversity issues) to a level that would not have been possible on the basis of existing local resources. This body of individuals will dissipate their learning further throughout Guyana, raising awareness of the importance of conservation and sustainable utilisation of biodiversity, as well as passing on practical skills. The GUYSUCO secondary training exercise in entomology (see above) is a marvellous example of course participants taking the initiative to actively promulgate what they have learned through this Darwin project. The proposed formation of an Entomological Society of Guyana (see above) is a further example of the enthusiasm amongst our course participants to establish and consolidate a wide network of entomologists in the country. Through such initiatives, enthusiasm, skills and information should spread, such that the impact of the Darwin training courses extends well beyond those who were directly involved. Thus, momentum for on-going capacity building activities has been established. It is not possible (or practical) to provide detailed information on the current activities of each of the course participants. However, it is apparent from the affiliations listed in Appendix VI that the training provided by this project has penetrated a range of sectors in Guyanese society.

The course participants are the ones who have benefitted most directly from the project, through the knowledge and skills imparted to them during training. Some will be able to apply these immediately in their current professional positions, resulting in potential indirect benefits of the project to others. For example, those who learn from the course participants, or are affected by improvements in environmental or agricultural practices instigated by them. One possible direct benefit to the course participants is their increased potential to find employment outside Guyana – the rate of emigration of trained professionals is rather high. Sadly, of course, this would dilute the longer-term, indirect benefits that might have accrued to local communities had those individuals remained in Guyana.

The project transferred entomological equipment and training materials to the University of Guyana, as well as training University staff. Hopefully, this institutional capacity building aspect of the project will have a long-term benefit to students and those communities that they later influence through their professional activities. Success in this area would be signalled most strongly by the establishment of additional classes and courses in entomology within the Faculties of Natural Sciences and Agriculture. However, although they have been discussed with senior academic staff, such developments are constrained by a general lack of resources at the University. A larger-scale project, dedicated specifically to the development of the Faculties themselves, could undoubtedly achieve more in this respect. (Cf. the DFID Guyana Forestry Commission Support Project, and its activities to enhance teaching of Forestry in the University of Guyana). However, relative to such costly initiatives, this Darwin project has provided very good value for money in its institutional capacity building element. Contacts will be maintained with the University of Guyana in order to assess developments.

The project has contributed to a favourable relationship between the UK and local partners, and amongst the local partners. Evidence of this, in terms of active collaborations, includes the agreement (during this project) of a partnership between CABI Bioscience, Iwokrama, the University of Guyana, the University of the West Indies and the Royal Botanic Gardens (Kew), to work on biodiversity inventory and bioprospecting on the Iwokrama reserve.

6. Project Outputs

A summary of actual project outputs is given in Appendix II (cf. Appendix V, which provides a summary of the agreed outputs). The main differences between actual and agreed outputs are discussed briefly below.

It had been hoped to recruit greater numbers of participants, including some from outside Guyana (from Surinam, for example), but a number of factors mitigated against this: promotion material was distributed later than planned; potential non-Guyanese participants experienced difficulty in securing funds to cover their travel costs; political unrest in Surinam (in 1999) and Guyana (in 1999 and 2001) made travel to / in Guyana much less attractive to many potential participants. Also, facilities at the University of Guyana were sufficiently limited that it was considered appropriate to reduce the target numbers of participants in order to maintain quality of teaching.

The project proposal and original Project Schedule indicated that 12 weeks part-time, tutored, project-based training would be provided to course participants, following the formal training courses (parts of outputs 4A,B and 6A,B). It appears that the implications of such a commitment were not fully considered at the time that the original project documents were prepared. In 1999, such project-based supplementary training was attempted, centred on the application of skills learnt through formal training to the building and curation of a personal insect collection,

including representation of as many insect orders (and Coleopteran families) as possible. This involved distance supervision by UK project personnel, guidance from local academics/professionals, and self help/assessment amongst the group of trainees. Logistically, this was very demanding, not least because of unreliable communications between the UK and Guyana (see elsewhere in this report). Given the less formal, part-time nature of this training, and the combination of distance and locally-based supervision, it is difficult to accurately determine the total period of work experience/training delivered under this output. It is thought that 12 weeks (as per the Project Schedule) is a fair estimate overall, allowing for varying levels of engagement by each participant. Such project-based work was not attempted following the 2001 course. It was considered more appropriate to direct efforts at encouraging the locally-led initiative to form an Entomological Society of Guyana (see above). Individual course participants may pursue project-based activities inspired by the training courses, and UK-based as well as local project personnel are happy to provide support on a case-by-case basis. For example, Ahnand Rajkumar has particular interests in the use of insect natural enemies against insect pests, and will be encouraged and assisted to develop initiatives in this field. However, experience in 1999 indicated that arranging, supporting and assessing project-based activities for all course participants was simply not practical, given the logistic difficulties and limited funds available to cover staff time.

The project proposal and original Project Schedule refer to the establishment of a University teaching collection (of insect specimens), and enhancement of the National Insect Collection (output 13A, and part of output 20). Again, this does not appear to have been adequately considered at the time that the project was originally designed. Firstly, there was little point in establishing a University of Guyana teaching collection, when the University hosts the insect collection of the Centre for the Study of Biological Diversity. This already includes groups of specimens set aside for teaching purposes. If Guyana has a designated National Insect Collection, it is the repository of specimens at the Centre for the Study of Biological Diversity, although the National Agricultural Research Institute (NARI) also holds an important collection of specimens of economically important species. The latter is in decline, but Aretha Peters (course participant in 1999 and 2001) now has responsibility for the NARI collection. As a result of the Darwin training, she now feels technically much better equipped to maintain the collection, but will be impeded in this work by a lack of resources and staff. Collection enhancement work by UK personnel under this project concentrated on the Centre for the Study of Biological Diversity holdings. As well as time spent curating the existing collection, achievements in this area included the 2001 return of material collected by trainers and trainees in 1999. Notable amongst this was a wide range of species from nine major families of Coleoptera, authoritatively identified by Roger Booth with reference to material held in the Natural History Museum, London. Andrew Polaszek also generously donated a reference collection of Hymenoptera, including representatives of 32 families, based on specimens collected and identified by international experts.

The establishment of an informal network amongst the course participants was considered to have been achieved after the 1999 course (bringing output 17A forward). This network was subsequently enhanced (output 17B) at the time of the 2001 course. Given the proposal for, and steps towards, the formation of an Entomological Society of Guyana, it is hoped that output 21 will more accurately describe this network in due course.

Publically accessible materials (other than promotional materials) were never intended as outputs of this project. Scientific publications were never likely to arise from the project, given its focus on training rather than research. The major printed outputs of the project (training manuals) are

enclosed with this report (hard copy only), as are examples of minor printed outputs (see Appendices VIII to X). It is likely that short reports of the project will appear in CAB International newsletters etc in the near future. It is also anticipated that diverse information on the legacy of the project will be disseminated within Guyana, through the activities of the University of Guyana and course participants network.

7. Project Expenditure

Expenditure category	Budget	Expenditure	Variance

There were no agreed changes to the budget, and variation in expenditure does not exceed 10% of the budget in any of the categories.

8. Project Operation and Partnerships:

The main local partners who participated in project activities are summarised below.

Name	Affiliation	Role in this project	Role in biodiversity issues
John Caesar	Univ. of Guyana	senior local co-ordinator 1999/2001	Dean, Faculty of Natural Sciences
Philip DaSilva	Univ. of Guyana	local co-ordinator 2001	Head of Biology Department, Faculty of Natural Sciences
Dindyal Permaul	Univ. of Guyana	local co-ordinator & teaching support 1999	Senior Lecturer, Faculty of Agriculture (now Permanent Secretary, Agriculture in the Guyanese government)
John Persaud	Univ. of Guyana	technical support 1999/2001	Head technician, Faculty of Agriculture
Dwayne David	Univ. of Guyana	technical support 1999/2001	Technician, Faculty of Agriculture
Mike Tamessar	Univ. of Guyana	logistical support 1999/2001	Curator/Manager, Centre for the Study of Biological Diversity
Keith David	Univ. of Guyana	logistical support 2001	Technician, Centre for the Study of Biological Diversity
David Hammond	Iwokrama	local co-ordinator 1999	Principal Forest Ecologist
Coralie Simmons	Iwokrama	teaching support 2001	Research scientist
Indjarit Ramdass	Univ. of Guyana / EPA	logistical support 1999/2001	Senior scientist, Centre for the Study of Biological Diversity and EPA
Ramesh Lilwah	EPA	logistical support 2001	Biodiversity Project Development Specialist
Elroy Charles	see column 4	local co-ordinator 2001	One of the best young entomologists in Guyana, EC is currently seeking a full-time position. He is closely associated with the Univ. of Guyana, the Guyana School of Agriculture, Iwokrama and Tropenbos, and worked under Yves Basset on Darwin project no. 162/4/130
Roderick Zagt (and staff)	Tropenbos- Guyana	provided accommodation for UK personnel in Guyana and logistical support 1999/2001	Team leader of this research and capacity building initiative for forest management in Guyana (http://www.etfrn.org/tropenbos/guyindex.html)

In addition to the main local partners listed above, the contributions of the following were also greatly appreciated, and deserve to be acknowledged:

Senior University of Guyana representatives, who supported the project and gave freely of their time at course ceremonies in 1999 and 2001, including Deans of Faculties, the Bursar, Vice-Chancellors Professor Harold Lutchman (1999) and Dr James Rose (2001), and Deputy Vice-Chancellors Dr Gem Fletcher (1999) and Dr Marlene Cox (2001).

The Faculty of Natural Sciences administrative and secretarial staff .

The Guyana Sugar Corporation (GUYSUCO), and particularly Basil Dasrat and Claudette Richards-Haynes, who allowed us access to a sugar plantation for insect collecting purposes, and provided a tour of their insect pest control facilities in 1999.

The course participants themselves, particularly Ahnand Rajkumar (1999/2001) and Dewendra Kumar (1999), who very generously gave their time and energy in making the UK project personnel welcome in Guyana.

Although included in the UK personnel described in the proposal, and elected as Project Manager by the original PI when the project commenced in October 1998, I had little involvement in the development of the proposal or in project planning at that crucial stage. Consequently, I have no first hand knowledge of the degree to which local partners were involved in that initial project planning process. On the basis of my experience in leading the implementation of the project, it appears that greater local partner involvement at that stage might have been useful. For example, it might have pre-empted the problems that arose in relation to availability of local facilities (notably microscopes and laboratory space) that rendered original estimates of numbers of course participants unrealistic. I also received comments from the senior local co-ordinator during the first training course that suggested that he would have appreciated greater involvement in the development of the proposal. Having said that, I experienced first hand the communications difficulties that can obstruct timely exchange of information and ideas between the UK and Guyana. The senior local co-ordinator could not be contacted by e-mail, and faxes regularly took up to 60 attempts before successful transmission was achieved. Telephone communication proved equally challenging on many occasions. The ability to contact other local co-ordinators/partners by e-mail was a blessing, but even this was not a fail safe mechanism. Considering these difficulties, and others (see elsewhere in this report), it may be that involvement of local partners in project planning was as great as practically possible, if less than would ideally have been the case. During the in-country phases of the project, communication was easier, and availability of time became the greatest constraint. At this stage (in both 1999 and 2001) plans were modified in response to prevailing circumstances and local consultation, but such modifications were relatively minor.

Although no similar (entomological capacity building) projects were underway in Guyana during the lifetime of this project, collaborative links were maintained with Iwokrama (see above). This is considered to have been particularly important, given the position of Iwokrama as the key centre for biodiversity work in the country at this time. The international nature of the Iwokrama initiative, and the breadth of its activities in rain forest conservation (see <http://www.iwokrama.org/>) make it pivotal in the development of policy and practice towards the fulfilment of CBD obligations in Guyana.

The nature of any Biodiversity Strategy Office (or equivalent) in Guyana is not entirely clear. A National Biodiversity Advisory Board exists, but this is a somewhat elusive body. The Environmental Protection Agency (EPA) has a major role in developing and implementing biodiversity legislation in Guyana (see elsewhere in this report) and was involved in the implementation of the project. The EPA and John Caesar (senior local co-ordinator for the project) both sit on the National Biodiversity Advisory Board.

In addition to the involvement of Iwokrama personnel, the international dimension of the project was bolstered by the participation of Vyju Lopez from the CABI Bioscience Caribbean & Latin American Centre (CLARC, Trinidad). This contribution was particularly valuable, given Vyju's first-hand knowledge of current developments in applied entomology in the Caribbean and Latin American region. Course participants with relevant professional interests were encouraged to join the Caribbean IPM [Integrated Pest Management] Network, a regional discussion group championed by CLARC.

Current (and potential future) collaborations and activities amongst local partners are described elsewhere in this report.

9. Monitoring and Evaluation, Lesson learning

The project proposal and Project Schedule described the strategy for monitoring and evaluation through: i) internal review of the project at 6 monthly intervals to ensure progress against stated and measurable objectives, and ii) the use of post-course questionnaires for participants to assess the scientific value and relevance of the courses.

Internal reviews were conducted at approximately 6 monthly intervals, and/or as required by developing circumstances in the implementation of the project. Unfortunately, the ambiguities that arose early in the project regarding the appropriate division of responsibility and accountability between the original PI and the Project Manager often reduced the value of these reviews.

Questionnaires were distributed to participants after the 1999 and 2001 training courses. Participants were asked to complete the questionnaires anonymously, and to rate various aspects of the courses on a 1 to 5 (poor, fair, good, very good, excellent) scale. Participants were also encouraged to record further comments on the courses, as they felt appropriate. Results are summarised below; rates of return were 17/18 in 1999 and 10/11 in 2001. All mean scores fall into the 4 to 5 (very good to excellent) range.

Questionnaire section 1: “How would you rate the course in terms of its **contribution to your knowledge and understanding** in the following areas?”

1999		2001	
Area	Mean score	Area	Mean score
The concept of biological diversity	4.7	Issues relating to insect biodiversity in general (rate the course overall)	4.6
The biology and ecological importance of insects	4.5	The identification and biology of major groups of Orthoptera	4.3
Methods for collecting and preparing insect specimens	4.7	The identification and biology of selected families of Coleoptera	4.4
Identification of major insect groups	4.5	The identification and biology of key groups of parasitic Hymenoptera	4.6
Insects as ecological (and biodiversity) indicators	4.5	The utilisation of insect biodiversity (eg. in agriculture, through biological control etc.)	4.0
		The conservation of insect biodiversity (its importance and the differing approaches used)	4.3

Questionnaire section 2: “How would you rate the following aspects of **the delivery of the course?**”

1999		2001	
Area	Mean score	Area	Mean score
Teaching materials (course manual, etc)	4.8	Teaching materials (course manual, etc.)	4.3
Lectures	4.7	Lectures	4.4
Lab work (demonstration of use of keys, insect preparation techniques, etc)	4.7	Lab work (demonstration of the morphological features of study groups, etc.)	4.8
Field work (demonstration of collecting techniques, etc)	4.5	Workshop session (The future for entomology in Guyana)	4.0

Key lessons to be drawn from the experience of this project:

A project planning/initiation visit to the host country proved very valuable in another Darwin project with which CABI Bioscience is currently involved (Ref no. 162/8/164), providing an opportunity for a nucleus of UK staff to familiarise themselves with local stakeholders and conditions/facilities in the country of operation. Provision for such a visit in the preparatory stages of this project would have helped overcome some of the difficulties later encountered.

10. Darwin Identity:

The Darwin Initiative logo was used on promotional materials for the training courses (see Appendix VIII), on materials produced for the course ceremonies (see Appendix IX and report photographs), on the covers of the course manuals, and on T-shirts distributed to course participants and project personnel (see report photographs). One participant reported that his mother had been so jealous of his 1999 course T-shirt, that he had felt obliged to pass it on to her as a gift. This suggests that the Darwin identity, as conveyed on course T-shirts at least, has penetrated deeper into Guyanese society than had been anticipated.

Efforts were made to ensure that all media coverage of the courses (notably that arising from the opening and closing ceremonies) recognised this as a Darwin Initiative project, and this was reflected in the television, radio and press outputs (see Appendix X). The course ceremonies also provided an opportunity to raise the profile of the project, and the Darwin Initiative, directly to an audience of invited guests. These included senior representatives of the University of Guyana, senior officials of the Environmental Protection Agency and other sectors of government, and (in 2001) the Deputy British High Commissioner.

This project has raised the profile of the Darwin Initiative in Guyana, directly (see above) and indirectly, through ‘word-of-mouth’ dissemination by those affected by the project. In combination with publicity generated by previous Darwin work in the country (project no. 162/4/130), this has led to an appreciable level of recognition of, and respect for, the Initiative and its aims in Guyana.

The largest single initiative in biodiversity conservation in Guyana is that associated with the Iwokrama International Centre. This Darwin project was highly complementary to the wide range of work planned and underway at Iwokrama, and involved direct collaboration with Iwokrama staff. Nonetheless, the project maintained a distinct identity, as an exercise in entomological capacity building delivered by CABI Bioscience and the University of Guyana, funded by the Darwin Initiative.

11. Leverage

No additional funding was obtained by this project during its lifetime, although significant in-kind contributions were made by the project partners, particularly in staff time. Although it is difficult to give a precise figure, around 50 days of staff time (of estimated value GB£7.5K) were ‘donated’ to the project by CABI Bioscience. This takes account of, and is over and above, the staff time which the original PI was unable to devote to the project, which was compensated for by additional inputs from other staff.

The project was designed with institutional as well as individual capacity building in mind (see elsewhere in this report). Through this aspect of the project, the University of Guyana is better equipped for involvement in future entomological research and training. Although no specific attempts have been made as yet to capture funds from international donors for similar projects, the on-going relationship between the University, CABI Bioscience and Iwokrama provides one mechanism for this. The greatest potential for involvement by the University in internationally-funded biodiversity work probably exists through its relationship with Iwokrama, which is a large-scale, high-profile and explicitly international initiative. The relationship between the University-based Centre for the Study of Biological Diversity and the Smithsonian Institution provides another potential route for international funding. The institutional capacity building delivered by this project should significantly assist the University to participate in entomological projects developed through either of these connections, as well as any future collaborations with CABI Bioscience.

12. Sustainability and Legacy

It is expected that the participants' network, and activities arising from it (secondary training, Entomological Society of Guyana) will provide some of the most enduring achievements of this project. UK and Trinidad-based project personnel are maintaining contact with the most active members of this network, and remain ready to provide support (where practical) to locally-led initiatives. The institutional capacity building aspect of the project has left the University of Guyana much better equipped to participate in entomological training and research. Wider constraints (resource/staff availability) will ultimately influence the ability of the University to capitalise on this increased capacity. However, it is hoped that this element of the project will also represent an enduring achievement. Future collaborations between the University and CABI Bioscience (or other institutions) will help to facilitate the use and development of this increased institutional capacity in the longer term.

The legacy of the project could have been improved by including a third phase of activities, specifically designed to develop the potential of the course participants' network and relevant University faculties/departments. This would be a logical area of activity for which to seek future funding. As noted above, there are opportunities for international funding to be explored (particularly in relation to further development of capacity in the University), for example, through Iwokrama and the Smithsonian Institution. An approach to the UK Government's Foreign and Commonwealth Office is also under consideration for support of activities to develop the course participants' network and University-based activities.

13. Value for money

The project provided for the delivery of two 2-3 week training courses in Guyana by internationally-recognised entomologists, and the transfer of approximately GB£14.2K worth of physical assets to the host country. A total of 22 students and professionals received direct training in entomology under the project. CABI Bioscience's 5-6 week, UK-based training courses are currently costed at between GB£4.5K and GB£7K per participant, suggesting that the equivalent training delivered in Guyana under this project was worth approximately GB£100K. At least one locally-led exercise in secondary training (Darwin trainees acting as trainers to pass on the knowledge and skills acquired under the project) was conducted, reaching a further 22 professionals. Less formal secondary training exercises have undoubtedly spread the contents of

the Darwin courses much further, and across a wide range of sectors of Guyanese society. The network of Darwin course participants was specifically encouraged to engage in such wider dissemination of knowledge and skills. The proposed formation of an Entomological Society of Guyana will formalise this network, and provide a vehicle for maintaining and increasing interest in entomology in the host country. Although the institution is constrained by the availability of other resources, the entomological equipment, books and training materials transferred to the University of Guyana has substantially increased its capacity to participate in future training and research. The time spent by UK project personnel in curating (and adding material to) the insect collection of the University-based Centre for the Study of Biological Diversity has also enhanced the potential of this important repository to act as a focus for future entomological work in Guyana. On-going collaboration between the project partners should ensure that momentum generated by the project is maintained. In these various respects, it is considered that the project, run on a relatively modest (in international terms) grant of around GB£75K, represented good value for money.

Author(s) / Date

Oliver Cheesman

Co-ordinator, Characterisation & Conservation of Biodiversity (CABI Bioscience)

October 2001

14. Appendix I: Project Contribution to Articles under the Convention on Biological Diversity (CBD)

Please complete the table below to show the extent of project contribution to the different measures for biodiversity conservation defined in the CBD Articles. This will enable us to tie Darwin projects more directly into CBD areas and to see if the underlying objective of the Darwin Initiative has been met. We have focused on CBD Articles that are most relevant to biodiversity conservation initiatives by small projects in developing countries. However, certain Articles have been omitted where they apply across the board. Where there is overlap between measures described by two different Articles, allocate the % to the most appropriate one.

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 which integrate conservation and sustainable use.
7. Identification and Monitoring	5	Identify and monitor components of biological diversity, particularly those requiring urgent conservation; identify processes and activities which have adverse effects; maintain and organise relevant data.
8. In-situ Conservation	5	Establish systems of protected areas with guidelines for selection and management; regulate biological resources, promote protection of habitats; manage areas adjacent to protected areas; restore degraded ecosystems and recovery of threatened species; control risks associated with organisms modified by biotechnology; control spread of alien species; ensure compatibility between sustainable use of resources and their conservation; protect traditional lifestyles and knowledge on biological resources.
9. Ex-situ Conservation		Adopt ex-situ measures to conserve and research components of biological diversity, preferably in country of origin; facilitate recovery of threatened species; regulate and manage collection of biological resources.
10. Sustainable Use of Components of Biological Diversity	5	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		Establish economically and socially sound incentives to conserve and promote sustainable use of biological diversity.
12. Research and Training	75	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		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		Countries shall ensure access to technologies relevant to conservation and sustainable use of biodiversity under fair and most favourable terms to the source countries (subject to patents and intellectual property rights) and ensure the private sector facilitates such assess and joint development of technologies.
17. Exchange of Information		Countries shall facilitate information exchange and repatriation including technical scientific and socio-economic research, information on training and surveying programmes and local knowledge
19. Bio-safety Protocol		Countries shall take legislative, administrative or policy measures to provide for the effective participation in biotechnological research activities and to ensure all practicable measures to promote and advance priority access on a fair and equitable basis, especially where they provide the genetic resources for such research.
Total %	100%	Check % = total 100

15. Appendix II Outputs

Please quantify and briefly describe all project outputs using the coding and format of the Darwin Initiative Standard Output Measures.

Code	Total to date	Detail
Training Outputs		
4a	3 undergraduate students receiving training	Participants in 1999 course.
4b	9 person weeks of training (undergraduate students)	Participants in 1999 course.
6a	20 people receiving other forms of short-term education/training [Note: Coded 6a/b (as per the Project Schedule), as the non-undergraduate trainees were considered to be professionals. They could equally have been classified as postgraduates, and coded 4c/d.]	Participants in 1999 and 2001 courses. One undergraduate participant from 1999 became a professional participant in 2001 – figures reported here take account of this.
6b	81.2 person weeks of training not leading to formal qualification [9 professionals x 3wks in 1999; 6 professionals x 3wks in 1999 + 2.2wks in 2001; 5 professionals x 2.2wks in 2001; 12wks of project-based training in 1999.]	Participants in 1999 and 2001 courses.
7	1 type of training material produced for use by host country	Although 1 type (training manual), 2 distinct manuals were produced, one for each course.
Research Outputs		
13b	1 species reference collection enhanced	The insect collection of the Centre for the Study of Biological Diversity.
Dissemination Outputs		
15a	2 national press releases or publicity articles in host country	The opening ceremonies of both courses (1999 and 2001) were featured in the national press in Guyana, generating at least 2 articles. See Appendix X for example of coverage.
15c	2 national press releases or publicity articles in UK	The project was featured in CAB International reports and newsletters with an international circulation on at least 2 occasions (<i>1998 In Review; Member Country News</i> , April 1999)
17a	1 dissemination network established in host country	An informal network of entomologists was established amongst the body of 1999 training course participants.

Code	Total to date	Detail
17b	1 dissemination network enhanced in host country	The above network was enhanced in 2001. Given the proposal for, and steps towards, the formation of an Entomological Society of Guyana, it is hoped that output 21 will more accurately describe this network in due course.
18a	2 national TV programmes/features in host country	The opening ceremonies of both courses (1999 and 2001) were featured on national TV news reports in Guyana.
19c	1 local radio interview/feature in host country	Relating to the 1999 course.
Physical Outputs		
20	Estimated value of physical assets handed over to host country: GB£14.2K.	
23	Value of additional resources raised for project: approximately GB£7.5K	No additional funds were raised for the project, but this is the estimated value of additional staff time contributed to the project by CABI Bioscience.

16. Appendix III: Publications

Provide full details of all publications and material that can be publicly accessed, e.g. title, name of publisher, contact details, cost. Details will be recorded on the Darwin Monitoring Website Publications database which is currently being compiled.

Mark (*) all publications and other material that you have included with this report

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (e.g. contact address, website)	Cost £

17. Appendix IV: Darwin Contacts

To assist us with future evaluation work and feedback on your report, please provide contact details below.

Project Title	Insect Biodiversity: Taxonomic Capacity Building in Guyana
Ref. No.	162/07/091
UK Leader Details	
Name	Dr Oliver Cheesman
Role within Darwin Project	Project manager
Address	CABI Bioscience, UK Centre (Ascot), Silwood Park, Ascot, BERKS, SL5 7TA
Phone	
Fax	
Email	
Partner 1	
Name	John Caesar
Organisation	University of Guyana [Dean, Faculty of Natural Sciences]
Role within Darwin Project	Senior local co-ordinator
Address	Faculty of Natural Sciences, University of Guyana, Turkeyen Campus, Georgetown, GUYANA.
Fax	
Email	

18. Appendix V: Project outputs and implementation timetable, as agreed under Project Schedule, including subsequent amendments as notified in project reports.

PROJECT OUTPUTS		
Date	Output Ref. No	Details
1998/1999 4-5/99 4-5/99 4-5/99	20(i) 7(i) 15A (i)	Transfer of physical assets (1999 course) to UoG Training manuals for 1999 course Local press release relating to 1999 course
1999/2000 5-6/99 5-6/99 5-6/99 5-6/99 7/99	19A(i) [amended to 19C] 18A* 4A, 4B, 6A, 6B(i) 17A 4A, 4B, 6A, 6B(ii)	Local radio interview relating to 1999 course National TV feature in host country 3 weeks formal training to 15+ Guyanese undergraduates and 10+ (Guyanese or other regional) postgraduates/ professionals Informal network established amongst course participants [output brought forward] 12 weeks part-time, tutored, project-based training to 15+ Guyanese undergraduates and 10+ (Guyanese or other regional) postgraduates/professionals
2000/2001 by 3/01 by 3/01 by 3/01 by 4/01 by 4/01 by 4/01 by 4/01 by 4/01	20(ii) 7(ii) 15A(ii), 15C 19A(ii) 4A, 4B, 6A, 6B(iii) 4A, 4B, 6A, 6B(iv) 17B* 13A (and 20(iii)) *outputs additional to those agreed under the Project Schedule	Transfer of physical assests (2nd course) to UoG Training manuals for 2nd course Local and UK press releases relating to 2nd course Local radio interview relating to 2nd course 3 weeks formal training to 3+ Guyanese undergraduates and 15+ (Guyanese or other regional) postgraduates/ professionals 12 weeks part-time, tutored, project - based training to 3+ Guyanese undergraduates and 15+ (Guyanese or other regional) postgraduates/professionals Enhancement of course participants network Establishment of UoG teaching collection and entomological training facilities; transfer of materials to Guyanese National Insect Collection (Biodiversity Centre)

PROJECT IMPLEMENTATION TIMETABLE	
Date	Key milestones
1998/1999 11/98 11/98-5/99 4-5/99 4-5/99 4-5/99	Liaison between UK and local parties over course recruitment/logistics Recruitment of local/regional participants Purchase and shipping of capital/consumable items (1999 course) Compilation, editing and production of training manuals (1999 course) Preparation/distribution of local press release
1999/2000 5-6/99 5-6/99 7/99 8/99	Further public awareness of 1999 course (eg local radio interview) 1999 course: conduct 3 weeks formal training as per proposal 1999 course: conduct 12 weeks part-time, tutored, project-based training as per proposal Curate insect specimens from 1999 course for establishment of UoG teaching collection/transfer to National Insect Collection
2000/2001 by 3/01 by 3/01 by 3/01 by 4/01 by 4/01 by 4/01 by 4/01 by 4/01	Purchase and shipping of consumable items (2nd course) Compilation, editing and production of training manuals (2nd course) Preparation/distribution of local/UK press releases Further public awareness of 2nd course (eg local radio interview) 2nd course: conduct 3 weeks formal training as per proposal 2nd course: conduct 12 weeks part-time, tutored, project-based training as per proposal Curate insect specimens from 2nd course for enhancement of UoG teaching collection/transfer to National Insect Collection Liaison with local institutions and course participants' network over development of future local training initiatives based on newly established facilities and local skills base.

19. Appendix VI: Training course participants

Participants in the Insect Biodiversity training course, University of Guyana, 31 May – 18 June 1999.

Name of Participant	Affiliation
Mr Harrinarine Doobay	Guyana Rice Development Board
Mr Satanand Narain	Guyana Rice Development Board
Ms Viviane Baharally	(Student) Faculty of Agriculture, University of Guyana
Mr Elton Patram	(Student) Faculty of Agriculture, University of Guyana
Mr Chandrapaul Sankar	Associated Industries Limited (AINLIM)
Mr Alvin Parag	Associated Industries Limited (AINLIM)
Ms Carmen Clowes	Cyril Potter College of Education
Ms Rosanne Willison	Government Analyst (Food & Drug Department)
Ms Aretha Peters	National Agricultural Research Institute (NARI)
Mr Ahnand Rajkumar	Guyana Sugar Corporation (GUYSUCO)
Mr Dewendra Kumar	Guyana Sugar Corporation (GUYSUCO)
Mr Harrinarain Lakhraj	Guyana Sugar Corporation (GUYSUCO)
Mr Curbette Victorine	Guyana Sugar Corporation (GUYSUCO)
Ms Victorine Kellman	Ministry of Agriculture
Mr Lawrence K I Saheed	(Student) City University of New York, Kingsborough (from Sept 1999)
Ms Cynthia Watson	(Technician) Centre for the Study of Biological Diversity, University of Guyana
Mr Ramasahai Ramnarain	Guyana Rice Producers Association
Mr Michael Chung	Private/Guyana Sugar Corporation (GUYSUCO)

Participants in the Insect Biodiversity II training course, University of Guyana, 23 April – 8 May 2001.

Name of Participant	Affiliation
Mr Harrinarine Doobay	Guyana Rice Development Board
Ms Viviane Baharally	Guyana Rice Development Board
Mr Satanand Narain	Guyana Rice Development Board
Mr Alvin Parag	Associated Industries Limited (AINLIM)
Mr Chandrapaul Sankar	Associated Industries Limited (AINLIM)
Mr Linsford Lagoudou	Iwokrama
Mr Henry James	Iwokrama
Ms Jewel Liddell	University of Guyana, Faculty of Natural Sciences
Mr Calvin Bernard	University of Guyana, Faculty of Natural Sciences
Ms Aretha Peters	National Agricultural Research Institute (NARI)
Mr Ahnand Rajkumar	Guyana Sugar Corporation (GUYSUCO)

20. Appendix VII: Summary of training course contents

Outline of contents: Insect Biodiversity training course, University of Guyana, 31 May – 18 June 1999.

Summary of main subject areas covered:

The concept of biological diversity
 Biology and ecological importance of insects
 Methods for collecting and preparing insect specimens
 Identification of insects to order level
 Identification of major Coleoptera (beetle) families
 Insects as ecological (and biodiversity) indicators

Date	Lectures/Activities	Leader(s)
31/5	OPENING CEREMONY General course introduction Introduction to biodiversity and biosystematics	Caesar/Permaul Cheesman Cheesman
1/6	The diversity & success of insects Visit to Centre for Biological Diversity (University of Guyana)	Cheesman Tamessar
2/6	Insect biology	Cheesman
3/6	The role of insects in natural ecosystems The role of insects in managed ecosystems	Cheesman Permaul
4/6	Insects as ecological (and biodiversity) indicators	Cheesman
5/6	Rest day	
6/6	Rest day	
7/6	Identification of insects (overview) Insect collecting methods Insect collecting in the field Preparation, storage & handling of insect specimens	Cheesman/Booth Booth Cheesman/Booth Booth
8/6	Identifying insects to order level	Booth
9/6	Biology & identification of Coleoptera (overview)	Booth
10/6	Insect collecting in the field Preparation, storage & handling of insect specimens Identifying insects to order level / beetles to family level	Cheesman/Booth Booth Booth
11/6	Biology & identification of Coleoptera	Booth
12/6	Rest day	
13/6	Rest day	
14/6	Biology & identification of Coleoptera	Booth
15/6	Insect collecting in the field (+ tour of GUYSUICO pest control facilities) Preparation, storage & handling of insect specimens Identifying insects to order level / beetles to family level	Cheesman/Booth Booth Booth
16/6	Insect identification review	Cheesman/Booth
17/6	Analysing insect biodiversity data Analysis of data collected during the course	Cheesman Cheesman
18/6	Course review CLOSING CEREMONY	Cheesman Caesar/Permaul

**Outline of contents: Insect Biodiversity II training course,
University of Guyana, 23 April – 8 May 2001.**

Summary of main subject areas covered:

General insect biodiversity issues
 Biology & identification of major groups of Orthoptera
 Biology & identification within selected families of Coleoptera
 Biology & identification of key groups of Hymenoptera
 Utilisation of insect biodiversity
 Conservation of insect biodiversity

Date	Lectures/activities	Leader(s)
23/4	OPENING CEREMONY General course introduction Review of key aspects of insect biodiversity	Caesar/DaSilva Cheesman Cheesman
24/4	Review of key aspects of insect biodiversity	Cheesman
25/4	Utilisation of insect biodiversity (overview) Diversity of insect pests / natural enemies in the Caribbean	Lopez Lopez
26/4	Biodiversity & biological control The Caribbean IPM network and other sources of information	Lopez Lopez
27/4	Conservation of insect biodiversity (overview) Insect conservation: temperate vs. tropical approaches Conservation / sustainable utilisation of biodiversity in Guyana	Cheesman Cheesman/Simmons Simmons
28/4	Rest day	
29/4	Rest day	
30/4	Identification of insects to order level (review) Biology & identification of Orthoptera	Cheesman Cheesman
1/5	Biology & identification of Coleoptera	Booth
2/5	Insect collecting in the field Biology & identification of Coleoptera	Booth Booth
3/5	Biology & identification of Hymenoptera	Polaszek
4/5	Insect collecting in the field Biology & identification of parasitic Hymenoptera	Polaszek Polaszek
5/5	Rest day	
6/5	Rest day	
7/5	Insect identification review Workshop: the future of entomology in Guyana	Cheesman/Booth/ Polaszek Cheesman/Booth/ Polaszek/visitors/ course participants
8/5	Course review CLOSING CEREMONY	Cheesman DaSilva

25. Appendix VIII: Example of training course promotional material [hard copy only]

26. Appendix IX: Example of course ceremony materials [hard copy only]

27. Appendix X: Example of press coverage of the project [hard copy only]

28. Appendix XI: Outline of secondary training course held at GUYSUCO [hard copy only]

