2013

University of Edinburgh

COMPARING BUTTERFLY DIVERSITY IN PLANTATION AND AGROFORESTRY SITES IN THE MANU NATIONAL PARK, PERU

Proposal for Peru expedition 2013

Index

Page

Introduction

Figure 1: [1] The Manu Learning centre is located in the cultural zone of the Manu National Park

Peru is situated on the western coast of South America. Approximately 53% of Peru is covered by forest [2]. The range of altitudes created by the ridge of the Andes creates an impressive variety of habitats ranging from cloud forest to mountainous terrain. Peru is rich in biodiversity, and is home to around 551 threatened species[2]. It also contains a significant portion of the Amazon rainforest, with the second greatest share of the forest after Brazil. Regardless of the richness of biodiversity, Peru has a low GDP per capita at 4403.1 (2009 estimate) and around 10% of the population is employed in agriculture[2].

In 1973 the Manu National Park was established with recognition of the need to protect the biodiversity of the area[1]. The park is situated on and beneath the eastern slopes of the Andes, and is now 1.5 million hectares in size[3]. It contains 10% of the world's bird species[3], 5% per cent of the world's mammal species[3] and at least 13 species which are classified as globally threatened, including the giant armadillo and the giant anteater[3]. The unique nature of this region has led to its protection and classification as a UNESCO World Heritage site[3].

The Manu National Park is divided into zones, each afforded different levels of protection[3] as demonstrated by Figure 2. The largest zone is the Restricted Zone shown in dark green on the figure, which is protected from outside interference, with only a select number of individuals granted access every year[3], another important zone is the Cultural Zone, which is shown on the map in light green [3].

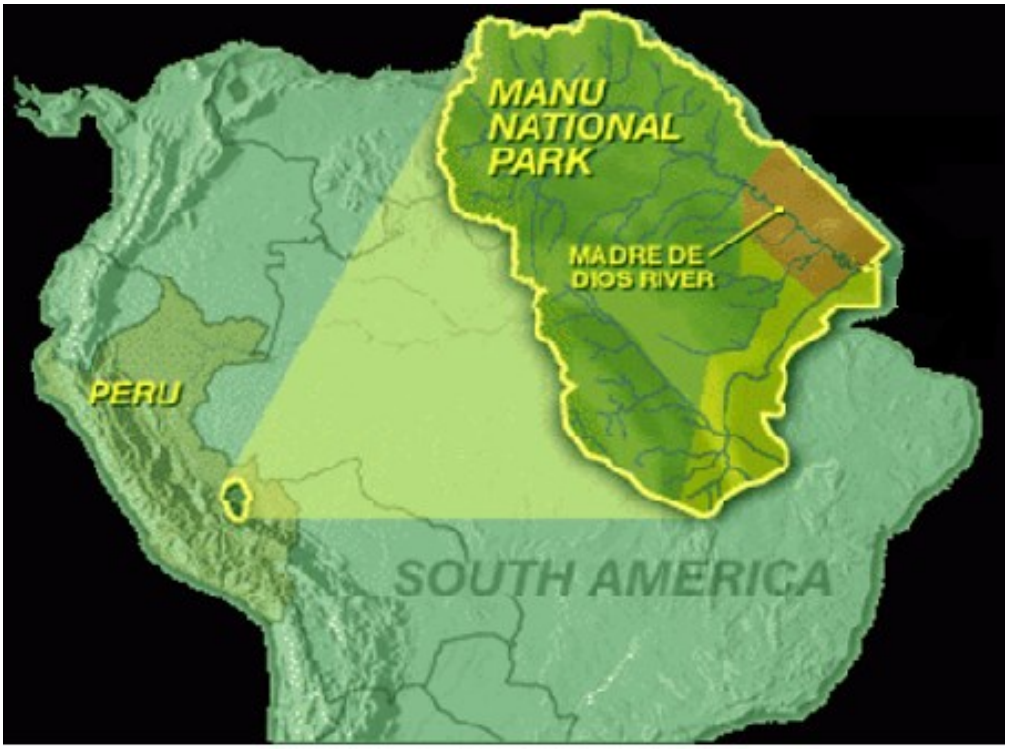

Figure 2: [Adapted from 4] Zonation of Manu National Park

The cultural zone is 19,395 ha in size and largely covered with tropical rainforest. Within this area logging, mining and hunting are allowed[3]. Deforestation is also permitted to make way for farmland, as well as for individual use. Poverty is high in this region, with many inhabitants surviving by subsistence farming. Education and development of sustainable farming in this area is therefore crucial both to provide a sustainable income and increased productivity for people living in this area[5], as well as to conserve habitat for the numerous species living in this area.

A relatively common type of crop farmed in the cultural zone is the banana. The traditional methods of establishing banana plantations involve deforestation and introduction of monocultures of banana plant. This results in areas of monoculture, with lines of banana plants, and few other species of vegetation, which is detrimental to the biodiversity of the fauna in the area. Agroforestry is one method which is being introduced in some places within the cultural zone with the aim to promote sustainable farming while also encouraging local biodiversity by introducing species of native hardwood and softwood trees to banana plantations. The rationale is firstly that the farmers will benefit from a sustainable income from the managed wood and secondly, ecosystems are healthier if there are higher levels of diversity of the flora in an area. The proposed expedition aims to assess levels of biodiversity in agroforestry areas compared to traditional banana plantations, in order to

determine whether the agroforestry techniques implemented by the CREES foundation are effective in encouraging a greater level of biodiversity than that present in the traditional plantation, and if so, the extent of the difference.

Background

The project will be carried out at the Manu Learning Centre (MLC).The MLC is run by the Conservation, Research and Environmental Education towards Sustainable Development, (CREES) foundation, a not-for-profit organisation based in Cuzco which aims to promote research and education by facilitating both scientific researchers as well as volunteers[1]. The MLC is a research centre based in the southern part of the Cultural Zone of the Manu reserve[1] on the bank of the Madre de Dios River. It is situated within a private reserve of 643 ha but has strong links with local farmers in the surrounding area, with whom several sustainable development projects are being run, one of which is the initiative to implement agroforestry. The proposed expedition has come as a response to the research centre's wish to assess biodiversity in the implemented agroforestry plots. We have been communicating with Andy Whitworth, the Scientific Co-ordinator and Biodiversity Officer of the MLC in order to ensure that the data collected by the proposed expedition will be useful to the on-going research at the MLC.

In 2009 in association with Oriel College, Oxford, the MLC started its agroforestry programme, by assisting local farmers with the implementation of agroforestry plots and aiding their upkeep[6]. The project was aimed at carbon offset, by planting both native softwood trees that have to be grown for 15 years, as well as native hardwoods that have to be grown for 40 years before harvesting is permitted. The list of species planted in a one hectare agroforestry plot is shown below[6]:

Softwoods and crop trees planted in the agroforestry plot	
Number planted per hectare	Species planted
122	Pastaco *Schizolobium amazonicum*
30	Copal *Bursera cuneata*
600	Banana *Musa* spp

Hardwoods planted at the periphery of agroforestry plots	
Number planted per hectare	Species planted
15	Aguano *Cedrelinga cateniformis*
10	Cedro *Cedrela* spp
13	Shihuahuaco *Diperyx micrantha*

The diversity of trees used in one agroforestry plot, is vastly different to the lines of monoculture banana plants seen in traditional banana plantation plots. Unlike traditional banana plantations which are dominated usually by a single species of banana, the one hectare agroforestry plots are designed so 20% of the plot is taken up by a border of hardwood trees, while the remaining 80%[6] is made up of lines of banana plants planted alternately with native softwood tees. The agroforestry initiative has

been introduced to farmers by CREES, and many of the farmers have started using agroforestry plots, but still have a larger number of traditional banana plantations. This will allow sampling of the two different farming styles in a similar area.

The diversity of trees used in these agroforestry plots as opposed to the monoculture of traditional banana plantations is thought to facilitate greater levels of biodiversity in the areas[5] but the extent to which this is the case in unknown. The aim of this expedition is to investigate the extent to which biodiversity is affected by introduction of agroforestry plots. Several studies have examined biodiversity with respect to agroforestry[5], but none have been conducted in Peru, and none have looked at the particular method employed by the MLC.

The assessment of biodiversity will be carried out through the use of butterflies as a biodiversity marker[6]. Nymphalidae will be the family of butterfly that the study focuses on as it has already been used as a marker of biodiversity in other studies conducted by the MLC into regeneration of secondary forest. Therefore, the data collected will be relevant and comparable to previous data, and hence support the work of the research centre.

A secondary aim of this project is to collect preliminary data on moth biodiversity in the area, which up to this point has not been investigated.

Aims

- The primary aim of this expedition is to complete a pilot study assessing the biodiversity within agroforestry plots compared to biodiversity found within traditional banana plantations.
- The secondary aim of the expedition is to collect preliminary data on moth biodiversity in the area.

Accommodation, safety and insurance

In Cuzco, the team will be staying in accommodation attached to the CREES Cuzco office. The accommodation is safe, with employees of CREES working and staying in the building, during the day as well as at night. While in the Amazon, the team will be staying in accommodation at the Manu Learning Centre. The accommodation is safe with usually at least five full time employees living on site at any one time, most of whom have already worked with Eleanor at the research centre before. In addition to the permanent staff there are usually a number of researchers working on shorter projects, as well as several volunteers. The centre has good links with the surrounding local communities, and there is limited crime in the area. Food will also be provided by the research centre.

In the field, the land on which the traps will be set up will belong to farmers who have worked with the MLC towards the implementation of sustainable farming for at least five years and who are well known to the MLC staff. It is through the good links that the MLC has with farmers that the team will be able to be introduced to these farmers and be given permission to carry out the research on their land. The fact that there have been no serious safety issues involving the MLCs volunteers who regularly help with the implementation of agroforestry plots is testimony to the safety of the current arrangement.

Both team members will have full comprehensive travel insurance covering medical costs, cancellations and reparation, and will take copies of their travel insurance policies with them to the Manu Learning Centre.

Materials and Methods

The project will be carried out by a team of two from the University of Edinburgh, both of whom will be fully involved in the collecting and identification of organisms.

The techniques of butterfly trapping and identification to be used are already well known to the team as in 2011 * spent a month as a volunteer at the Manu Learning Centre. During her time at MLC time she worked with researchers who will still be working at the centre at the time of the proposed expedition, and learnt how to use the butterfly traps at the centre as well as how to handle and identify Nymphalidae butterflies. The experience in butterfly capture and identification was gained through time Eleanor spent helping with one of the centre's on-going projects to catalogue the butterflies in the area surrounding the Manu Learning Centre.

Assessment of biodiversity

Four paired plots[7] will be selected. The plots will be selected so that each of the four plots will have a pair with a similar area of one hectare, a similar location in areas within two miles of each other and will have a similar altitude and proximity to natural features, such as the Madre de Dios River and the forest. The only major difference will be that one plot is being farmed using agroforestry, while the other is farmed using traditional methods. All plots selected will be near the settlements of Salvacion or Auganos, both of which are within a day's travel by foot and boat from the MLC.

Only agroforestry plots which have been established for five or more years will be used as it takes time for the different species planted as part of the agroforestry scheme to become established. The banana plantations will also be selected to have been established for five or more years.

Butterflies will be collected from a single pair of plots over a period of four days, after this period the traps will be moved to the next pair of plots. The order in which the plots are tested will be determined randomly by a random number generator. When a pair of plots is assessed there will be four traps set up in the agroforestry plot, and four traps set up in the banana plantation. Traps will be bated with banana[8] which has been allowed to ferment with beer for 48 hours. The bait will be changed every day and the butterflies collected from the traps every day over the four day period.

The location of the traps within the plots will be determined randomly. To do this each of the plots will firstly be divided into a grid. Coordinates will be generated randomly and the first four sets of coordinates to be feasible for hanging the traps will be used to determine the location of traps in one plot. The positions of the traps will be changed every day, using the same method of positioning them at a random location

For butterfly identification, the centre's previous work has provided a catalogue of species previously caught at the MLC, and this catalogue will be used as reference for identification. The catalogue will

allow us to take images of a selection of the most commonly caught Nymphalidae species to be taken to the capture sites. Butterflies which can be identified on site will be noted, and immediately released. Butterflies which cannot be identified immediately will be taken back to the research base for further identification, through reference to the MLC catalogue of butterflies, and further reference sources available at the MLC before release.

Analysis of data

The data will be assessed in two ways:

Firstly the diversity index of butterfly species will be calculated using both the Shannon index and Simpson index. This will give an indication of the diversity of species in the area

Secondly the diversity index will be used for analysis of variance, which will be carried out back in Edinburgh using tab software. This will suggest whether the variation between the pairs of plots is greater than background variation.

The results may show higher levels of biodiversity within the agroforestry plots than within the plots of traditional forestry, in which case the research will confirm the benefit which implementation of this type of farming has on the ecosystems of the surrounding areas, which may provide further evidence to encourage the increased use of agroforestry methods. Alternatively, results may show that there is little difference in biodiversity between the agroforestry plots and the traditionally farmed plots, in which case there would be the data to encourage the possible use of different flora as part of the agroforestry scheme, which could in turn lead to a better system of farming.

Equipment bought to the centre

While most of the equipment required for the expedition, including the butterfly traps, will be provided by the research centre, the centre does not possess moth trapping equipment, as such we intend to bring the necessary equipment with us to the centre. The necessary equipment includes one lightweight, waterproof, battery operated moth trap, a charger and, given the remote conditions of the centre we also intend to also bring a set of spare parts to allow for repairs. Once the project is ended we intend to donate the moth trap, charger and spare parts to the research centre in order for them to carry out further work on the moths in the area.

Sample Tables for data collection

Table 1:

Raw data collection for Pair 1: agroforestry plot

Species of Nymphalidae	Gender	Notes
Pair 1 : Agroforestry plot: Day 1		
Pair 1 : Agroforestry plot: Day 2		
Pair 1 : Agroforestry plot: Day 3		
Pair 1 : Agroforestry plot: Day 4		

Table 2:

Pair 1: Diversity index of agroforestry plot and traditional banana plantation plot for over four days		
Date of start:	Diversity index	
Day	Agroforestry plot	Traditional banana plantation
1		
2		
3		
4		

Table one is an exemplar table of the table which will be used to collect raw data. Separate tables will be used for the agroforestry plot and the banana plantation. Table 2 is an exemplar table of a table which will be used in order to present the diversity index, before the analysis of variance is calculated.

Moth assessment

Moth trapping will be carried out in two different types of secondary forest, in the tornillo forest, and the bamboo forest. Trapping will be carried out in each of these forest types four times. The site for trapping each time will be selected by dividing the transects in each of these forest types, which are within a fifteen minute walk from the MLC, by a grid, then randomly generating coordinates. Once viable coordinates are generated this will be site selected for trapping. The order in which each of the forest types will be trapped will be selected randomly by the use of a random number generator.

The traps will be set up soon after darkness, and will be active for a period of two and a half hours. Moths which can be identified on site will be released immediately; those which cannot be immediately identified will be brought back to the base for further identification before release.

Analysis of data of Moth Assessment

Similarly to the analysis of the Nymphalidae data:

Firstly the diversity index of moth species will be calculated using the Shannon index and Simpson index. This will give an indication of the diversity of species in the area

Secondly the diversity index will be used for analysis of variance, which will be carried out back in Edinburgh using tab software. This will suggest whether the variation between the types of secondary forest is greater than background variation.

The results will be useful to the research base as this small scale study will feed into their on-going work to investigate regeneration of the rainforest by comparing biodiversity in different types of secondary forest. Also, as a study looking specifically at moths in the area has not been carried out, the study will be useful for gathering preliminary data on the different species of moth which are present in the area.

Time spent in the field each day

While carrying out butterfly trapping, the team expect to leave the centre at around nine in the morning and return to the centre at between midday and one in the afternoon. However, there will be some variation in times depending on which plots are being surveyed whether it is a day when traps are being set up or checked, and how many butterflies are caught. On days when the moth trapping is being carried out the team will leave the centre shortly after darkness and plan to return to the centre within three hours of departure. In both cases, the staff at the research centre will be made aware of destination, route and expected hour of return.

Expedition Timetable

Date	Plan for the day	Plan for the night
16-Jun	Depart from London on Cuzco bound flight	
17-Jun	Arrive in Cuzco stay in CREES accommodation	
18-Jun	Acclimatisation and rest	

19-Jun	Leave for MLC	
20-Jun	Arrive at the MLC late afternoon	
21-Jun	Survey plots and orientation and equipment check	Check moth trap
22-Jun	Set up traps in first pair of plots	
23-Jun	Collect from traps in first pair of plots	
24-Jun	Collect from traps in first pair of plots	Moth trapping
25-Jun	Collect from traps in first pair of plots	
26-Jun	Collect from traps in first pair of plots and move traps to second pair of plots	
27-Jun	Collect from second pair of plots	
28-Jun	Collect from second pair of plots	Moth trapping
29-Jun	Collect from second pair of plots	
30-Jun	Collect from second pair of plots and move traps to third pair of plots	
01-Jul	Collect from third pair of plots	
02-Jul	Collect from third pair of plots	Moth trapping
03-Jul	Collect from third pair of plots	
04-Jul	Collect from third pair of plots and collect traps	
05-Jul	Rest day	
06-Jul	Set up traps in first pair of plots	
07-Jul	Collect from traps in fourth pair of plots	Moth trapping
08-Jul	Collect from traps in fourth pair of plots	
09-Jul	Collect from traps in fourth pair of plots	
10-Jul	Collect from traps in fourth pair of plots and move traps to second pair of plots	
11-Jul	Collect from fifth pair of plots	Moth trapping
12-Jul	Collect from fifth pair of plots	
13-Jul	Collect from fifth pair of plots	
14-Jul	Collect from fifth pair of plots and move traps to sixth pair of plots	

Expedition Timetable

Date	Plan for the day	Plan for the night
15-Jul	Collect from sixth pair of plots	Moth trapping
16-Jul	Collect from sixth pair of plots	
17-Jul	Collect from sixth pair of plots and collect traps	
18-Jul	Rest day	
19-Jul	Set up traps in seventh pair of plots	

20-Jul	Collect from traps in seventh pair of plots	Moth trapping
21-Jul	Collect from traps in seventh pair of plots	
22-Jul	Collect from traps in seventh pair of plots	
23-Jul	Collect from traps in seventh pair of plots and	
24-Jul	Rest day	
25-Jul	Set up traps in the eighth pair of plots	
26-Jul	Collect from eighth pair of plots	
27-Jul	Collect from eighth pair of plots	
28-Jul	Collect from eighth pair of plots	
29-Jul	Collect from eighth pair of plots and collect traps	Moth trapping
30-Jul	Moth identification, and completion of butterfly identification	
31-Jul	Contingency day	
01-Aug	Contingency day	
02-Aug	Travel back to Cuzco. Arrive late at night stay at CREES accommodation.	
03-12 Aug	Privately funded own travel	
13-Aug	Fly out from Cuzco to England	

Budget

Expenditure	Cost (£)
Flight return London – Cuzco	1667.90
Transport between MLC and Cuzco	396.80
Accommodation costs MLC (45 days)	1,255.50
Accommodation costs Cuzco (three nights)	93.00
Moth trap and spare parts	100.00
Immunizations/ first aid kit	350.00
Insurance	246.00
Total	**4109.20**

Personal contribution **£ 1109.25**

Sum requested from the Davis Expedition fund **£3000.00**

Personal statements

* (Expedition leader)

I am a third year undergraduate studying Biological Sciences at the University of Edinburgh, who entered directly into the second year of the course after achieving 40 points in the IB. I am fascinated by the levels of biodiversity in the Amazon, and excited by the opportunity to investigate agroforestry as a way of co-existence between farming and local biodiversity. My interest in agroforestry came about through my experience volunteering for a month at the MLC in 2011. During my time at the MLC I collected data on biodiversity within different types of secondary forest in the area, and learnt a range of techniques including butterfly trapping. I also volunteered with the agroforestry initiative, where I became interested in the effect of this type of farming on local ecosystems. I gained further experience of working with an established research group in a different area in 2012, when I spent ten weeks as an intern in the Schirmer lab, optimising lentivirus transfections. In addition to this, I have continued to develop leadership skills and gain experience outside the scope of my degree through my role as head of the Biological Sciences department of Edinburgh University Young Scientific Researchers Association (EUYSRA).

*

I am a current undergraduate student at the University of Edinburgh, in the third year of my Biological Sciences degree. I have always been fascinated by the earth's incredible diversity of species and the ingenuity of adaptation that occurs within ecosystems. This has led to a keen interest in conservation, with a particular focus on the rainforest habitats that are disappearing so rapidly, allowing the loss of huge amounts of diversity including as yet undiscovered species. However I have also seen first-hand how fundamentally important agriculture can be to rural communities in the developing world through my volunteer work on development projects in rural Malawi, and am very much interested in looking at the ways in which the impact of agriculture on the diverse amazon ecosystem can be minimised whilst enabling local communities to make a living from the land. In summer 2012 I gained valuable experience in the field of agricultural research working as a research assistant at the Scottish Agricultural College (SAC) involved in both lab and field work examining variation in greenhouse gas emissions of soil after treatment in a variety of different ways. I am a methodical, driven and enthusiastic individual and feel this expedition would be greatly beneficial to my education whilst enabling research in an incredibly important field.

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Fieldwork Assessment Form FA1

(Refer to Notes for Guidance before completing this form)

School Assessment No.	NA
Title of Fieldwork Activity:	Comparing butterfly diversity in plantation and agroforestry sites in the Manu National Park, Peru
Location(s) of Work:	Work will be carried out in the Manu National Park, Peru. Within the park, the team will be based at the Manu Learning Centre, and from here work will be carried out in the local farms associated with the nearby settlements of Salvacion and Auganos.
Duration (incl. dates From / To) :	46 days 17/06/2013 - 2/08/2013

Brief Description of Fieldwork:

The main focus of field work will be butterfly trapping. Butterfly traps will be set up in banana growing plots paired on the bases such as size, proximity to natural features like rivers, and altitude. The major difference between the paired plots is that one plot will be farmed using agroforestry methods, while the other is farmed using traditional methods.

One pair of plots will be studied consistently for a four day stretch, during which time butterflies will be trapped and collected every day and the bait replaced. After collection the insects will be identified and released.

In total, four pairs of plots will be studied, each for two sets of four days, the order in which the plots will be studied will be determined randomly. The farms on which the traps will be set are a distance which can easily be reached from the Manu Learning Centre within a day and are owned by farmers who are well known to the research centre, having worked with the centre on sustainable forestry projects for five or more years. The data collected will be important in allowing the Manu Learning Centre to assess the effect of the implemented agroforestry, while also providing data which supports the centres on going work to investigate regeneration of secondary forest.

The secondary focus of fieldwork will be moth trapping. This will take place within the secondary forest in the reserve privately owned by the MLC and will be carried out along established transects, which are well marked and close to the research centre. In total trapping will be carried out eight times, four times within the tornillo forest, and four times within the bamboo forest close to the centre. Trapping will take place soon after dark , and the Manu Learning Centre staff will be made aware of our expected hour of return, and the transects which we will be trapping.

Hazard Identification: Identify all the hazards; evaluate the risks (low / medium / high) and describe all necessary control measures.

Hazard (s)	**Risk** L / M / H	**Control Measures**	**Risk after Control** L / M / H
Physical Hazards (e.g. extreme weather conditions, cliffs, caves, mountains, marshes, quicksand, fresh / seawater, mines, quarries, tides)	M	Water and waterproofs will be taken on every departure from the research centre. Areas of work will be well known to the research centre and the team will be made aware of any potential dangers in the area, so they can be safely be avoided.	L
Biological Hazards (e.g. poisonous plants, venomous / aggressive animals, soil or water micro organisms, insects)	M	The team will be familiarised with local potentially dangerous plants or animals on arrival at the research centre. Dangerous animals in the area, like jaguar or alligators are notoriously shy, and are very rarely seen, in the event of sighting these creatures no sudden movements will be made and the team will stay together and make noise so as to scare away the animal. Venomous snakes are present in the area, in the case of an encounter team	L

		members will keep a distance of at least two meters, in addition to this team members will avoid the risk of startling snakes by not putting hands in holes in the ground or tree hollows Potentially dangerous insects will be avoided by the use of a mosquito net at night and the use of insect repellent during the day. Also, clothing and towels will not be left on the floor at the centre, and footwear will be checked for insects before wearing. Risk from water microorganisms will be reduced as only purified water will be used, and only areas of water deemed safe by the staff of the research centre will be used for bathing or swimming.	
Chemical Hazards (e.g. pesticides, dusts, contaminated soils, chemicals on site)	L	Unknown and potentially dangerous substances will be avoided. We will not trap plots which have been recently sprayed with chemicals which are potentially dangerous.	L
Man-made hazards (e.g. machinery, electrical equipment, vehicles, insecure buildings, slurry pits, power and pipelines)	L	Care will be taken around machinery or electrical equipment. Insecure buildings will not be entered. All vehicles travelled in during the expedition will have been approved by Manu Learning Centre, and drivers for the journey to and from the research centre will be	L

		employees at Manu Learning Centre.	
Personal Safety (e.g. lone working, attack on person or property, first aid)	M	Travel by truck to and from the research centre will be only done with drivers that are approved by the research centre. Travelling between the research centre and the farms will only occur with a group of two or more, routes to the farms will be shown by a member of the Manu Learning Staff, wherever possible part of the route to the farms will be through the private reserve owned by the Manu Learning Centre. Both members of the team from Edinburgh will carry out work in the field to avoid lone work. The farmers in whose farms the work will be carried out have worked with research centre for at least five years and are well known to the researchers. The Edinburgh team will be introduced to the farmers by one of the staff from the research base before work commences. Times of expected return to the base will be recorded. There is a first aid kit at the research base, but the team will bring an additional first aid kit to the research base, which will include a set of sterile syringes, and a basic first aid kit which they will take with them in the field.	L
Environmental impact (e.g. refuse, pollution, disturbance of eco-systems)	L	The research centre is careful about disposal of waste materials from living, cooking and bathing from the research base. Very little	L

		electricity is used at the centre, with lighting after dark provided by candles. Running water is provided by a pumping system driven by running water from a nearby stream, which further reduces pollution from powering the pumping centre. During the research project, local ecosystems will not be disturbed as the majority of butterflies collected will be identified at the site of collection and immediately released, only those which we are unable to identify will be brought back to the base for further identification before release later.	
Other hazards (e.g. procedural, manual handling) Please specify.	M	There is the risk from trapping harmful creatures like bullet ants in the traps, but bites from these creatures are rarely fatal. The risk will be limited by care being taken while removing the butterflies, and antihistamine will be brought to the research centre.	L

**Continue on separate sheet if necessary*

Emergency Procedures: Specify arrangements for first aid, special emergency procedures, survival aids, communication, etc.)

Before the expedition both team members will undertake a first aid course to ensure safety in the field, in addition to this, there are trained first aiders on site at the research base and all volunteers and researchers are given basic training as to how to act in the case of an emergency including insect or animal bites. Viper anti-venom is available at the research centre. A stocked first aid kit will also be carried by the team when they are working in the field.

In the case of severe emergencies:

- The first point of contact will be to alert staff at the center to the emergency.

- The next point of contact will be to communicate with the CREES office in Cusco.
- The CREES office will be able to coordinate emergency evacuation, if appropriate.
- In the case that evacuation is needed then the casualty will be transported to the airstrip, which is currently used to fly tourists to the Romero research base, from here the casualty can be flown back to Cusco for treatment, which will take around two hours.
- The next of kin of the casualty will be notified of the incident through the Cuzco CREES office.

Additional Information: Identify any additional information relevant to the fieldwork activity, including supervision, training requirements, information, specialist equipment or clothing, inoculations, etc.

- All required vaccinations will be up to date, and additional precautionary vaccinations will also be acquired including rabies.
- Supervision will be from the research centre staff, who will be able to help should serious issues be encountered.
- Eleanor has already been trained in collection technique that will be used, and the team will be made aware of particular fauna and flora to avoid in the field whilst on site.
- Protective equipment like wellington boots and mosquito nets are supplied and maintained by the research base, long trousers and long-sleeved tops will be worn in the field for added protection against potentially harmful fauna or flora.
- The butterfly traps that will be used will be supplied by the research centre, where they have been used in the past.
- Next of kin details will be submitted to the CREES Cuzco office who will be able to contact the next of kin in the event of an emergency.

Contact Information: Include details of both the University designated contact and on-site contact.

University Edinburgh	Name: *	Tel. Contact:

On-site	Name: *	Tel. Contact:
Address of residential base: Peru (Details are of the head office contact, the Manu Learning Centre itself is mainly contactable through the internet, but contact with the Manu Learning Centre can be facilitated through contact with the head office)		

Has necessary training and information been given?	Yes ☐	No ☐	N/A ☐
Is there adequate provision for those with health problems or disabilities?	Yes ☐	No ☐	N/A ☐
Are there adequate First Aiders available?	Yes ☐	No ☐	N/A ☐
Is there suitable supervision (i.e. Staff to Student ratio)?	Yes ☐	No ☐	N/A ☐
Is permission required to work on site?	Yes ☐	No ☐	N/A ☐
Are there suitable travel arrangements and licensed drivers?	Yes ☐	No ☐	N/A ☐
Is adequate insurance cover in place? *(Contact Finance Office for advice, 50-9154)*	Yes ☐	No ☐	N/A ☐

Have all participants submitted next of kin information to field trip organiser / School Office?	Yes ☐	No ☐	N/A ☐
Have route notification schedules been provided to Police or Coastguard?	Yes ☐	No ☐	N/A ☐

Assessment carried out by:

Name:	*	Date:	18/01/13
Signature:		Review Date:	
Expedition Leader			

Assessment Authorised by Head of School / Fieldwork Supervisor:

Name:	NA	Date:	
Signature:			

Amendments to the expedition proposal

Manu National Park, Peru, 2013

*** and ***

1) Clarification of the £100 item of equipment:

While most of the equipment required for the expedition, including the butterfly traps, will be provided by the research centre, the centre does not possess moth trapping equipment, and as such we intend to bring the necessary equipment with us to the centre. The necessary equipment includes one lightweight, waterproof, battery operated moth trap, a charger and, given the remote conditions of the centre we also intend to also bring a set of spare parts to allow for repairs. Once the project is ended we intend to donate the moth trap, charger and spare parts to the research centre in order for them to carry out further work on the moths in the area.

(Page 7 of the amended proposal)

2) Details of how long we will be in the field every day:

While carrying out butterfly trapping, the team expect to leave the centre at around nine in the morning and return to the centre at between midday and one in the afternoon. However, there will be some variation in times depending on which plots are being surveyed whether it is a day when traps are being set up or checked, and how many butterflies are caught. On days when the moth trapping is being carried out the team will leave the centre shortly after darkness and plan to return to the centre within three hours of departure. In both cases, the staff at the research centre will be made aware of destination, route and expected hour of return.

(Page 9 of the amended proposal)

3) Revised Field Work assessment:

a. Details of evacuation procedures:

In the case of severe emergencies:

- The first point of contact will be to alert staff at the center to the emergency.
- The next point of contact will be to communicate with the CREES office in Cusco.
- The CREES office will be able to coordinate emergency evacuation, if appropriate.
- In the case that evacuation is needed then the casualty will be transported to the airstrip, which is currently used to fly tourists to the Romero research base, from here the casualty can be flown back to Cusco for treatment, which will take around two hours.
- The next of kin of the casualty will be notified of the incident through the Cuzco CREES office.
  (Page 5 of the amended risk assessment)

b. Conformation that the first aid kit will be with us in the field:

A stocked first aid kit will also be carried by the team when they are working in the field.

(Page 5 amended risk assessment)

c. Conformation that sources of anti-venom have been identified:

Viper anti-venom is available at the research centre.

(Page 5 amended risk assessment)

d. Conformation that next of kin details have been submitted:

Next of kin details will be submitted to the CREES Cuzco office who will be able to contact the next of kin in the event of an emergency.

(Page 6 amended risk assessment)