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Candidate session number

Candidate name

School number

School name

Examination session (May or November)

MAY

Year

2012

Diploma Programme subject in which this extended essay is registered: ENVIRONMENTAL SYSTEMS AND SOCIETIES
(For an extended essay in the area of languages, state the language and whether it is group 1 or group 2.)

Title of the extended essay: A comparison of conservation
efforts for the Bornean Orangutan (Pongo
pygmaeus) and the Violet Click Beetle (Limonsius violaceus)

Candidate's declaration

This declaration must be signed by the candidate; otherwise a grade may not be issued.

The extended essay I am submitting is my own work (apart from guidance allowed by the International Baccalaureate).

I have acknowledged each use of the words, graphics or ideas of another person, whether written, oral or visual.

I am aware that the word limit for all extended essays is 4000 words and that examiners are not required to read beyond this limit.

This is the final version of my extended essay.

Candidate's signature:

Date:

9/02/2012

Supervisor's report and declaration

The supervisor must complete this report, sign the declaration and then give the final version of the extended essay, with this cover attached, to the Diploma Programme coordinator.

Name of supervisor (CAPITAL letters) _____

Please comment, as appropriate, on the candidate's performance, the context in which the candidate undertook the research for the extended essay, any difficulties encountered and how these were overcome (see page 13 of the extended essay guide). The concluding interview (viva voce) may provide useful information. These comments can help the examiner award a level for criterion K (holistic judgment). Do not comment on any adverse personal circumstances that may have affected the candidate. If the amount of time spent with the candidate was zero, you must explain this, in particular how it was then possible to authenticate the essay as the candidate's own work. You may attach an additional sheet if there is insufficient space here.

From the outset demonstrated a sincere interest in the topic of conservation and was keen to research this for her extended essay. She conducted a vast amount of background research in order to formulate her research question. The research encompassed textbooks, the internet and journals. collected so much data that her first major challenge was to select the most scientifically relevant data. She proved skillful at doing this. The major problem she faced was the lack of available data about the Violet Click Beetle. She managed to locate the only researcher in the country studying this beetle and spoke to him to obtain the information she needed. In the viva voce Alice demonstrated excellent understanding of the topic.

This declaration must be signed by the supervisor; otherwise a grade may not be issued.

I have read the final version of the extended essay that will be submitted to the examiner.

To the best of my knowledge, the extended essay is the authentic work of the candidate.

I spent hours with the candidate discussing the progress of the extended essay.

Supervisor's signature: _____

Date: _____

25/2/2012

Assessment form (for examiner use only)

Candidate session number

Achievement level

Criteria	Examiner 1	maximum	Examiner 2	maximum	Examiner 3
A research question	2	2	2	2	
B introduction	2	2	2	2	
C investigation	4	4	4	4	
D knowledge and understanding	4	4	4	4	
E reasoned argument	4	4	4	4	
F analysis and evaluation	4	4	3	4	
G use of subject language	4	4	4	4	
H conclusion	2	2	2	2	
I formal presentation	4	4	3	4	
J abstract	2	2	2	2	
K holistic judgment	4	4	4	4	
Total out of 36	36		34		

Signature of examiner 1: _____
(CAPITAL letters)

Examiner number: _____

Signature of examiner 2: _____
(CAPITAL letters)

Examiner number: _____

Signature of examiner 3: _____
(CAPITAL letters)

Examiner number: _____

IB Cardiff use only: B: _____

IB Cardiff use only: A: 091209

Date: 2/5

A comparison of conservation efforts for the Bornean
Orangutan (*Pongo Pygmaeus*) and the Violet Click Beetle
(*Limoniscus Violaceus*)

Subject = Environmental Systems and Societies

Name =

Word Count = 3998

...very different point again to research

Contents

<u>Abstract</u>	<u>3</u>
<u>Introduction</u>	<u>4</u>
<u>Background of Each Species</u>	<u>5</u>
<u>Methods of Investigation</u>	<u>8</u>
<u>Investigation</u>	<u>10</u>
<u>Discussion</u>	<u>20</u>
<u>Conclusion</u>	<u>25</u>
<u>Acknowledgements</u>	<u>26</u>
<u>Bibliography</u>	<u>30</u>
<u>Appendix I</u>	<u>32</u>
<u>Appendix II</u>	<u>33</u>
<u>Appendix III</u>	<u>34</u>

Abstract

This paper examines the research question: A comparison of conservation efforts for the Bornean Orangutan (*Pongo Pygmaeus*) and the Violet Click Beetle (*Limoniscus Violaceus*).

Research about the conservation of each species was undertaken and the public's views on each species were found. The comparison of conservation efforts illustrated more support for *P. pygmaeus*, in addition the results from the public also favoured *P. pygmaeus*. These methods of investigation helped give a comparison of the conservation efforts for each species. The number of species within each class, Anamalia and Plantea, who were classified as endangered were compared with the total number of species within each class. Furthermore the threats that posed a risk towards each species were found. These methods helped to investigate why the difference in conservation and public views occurred.

The conclusion of the paper was that *P. pygmaeus* was preferred in the context of conservation efforts because, as a mammal, data about *P. pygmaeus* can be collected more easily and therefore helped more easily. Also there are more benefits for humans conserving *P. pygmaeus*. The public also favoured *P. pygmaeus* as it is an iconic species which they are familiar with and share similar physical characteristics with.

P. pygmaeus is a

Introduction

I have had a keen interest in the ecology and the preservation of living things since childhood and was drawn to the issue of conservation. Whilst reading around the subject I wondered why there was so much more effort going into conserving some groups of organisms than others, for example Anamalia compared with Plantae. I realised this could be the basis for my paper, but this specific example was much too broad. I decided to choose two classes from the kingdom Anamalia, which led to the research question of:

A comparison of conservation efforts for the Bornean Orangutan (*Pongo Pygmaeus*) and the Violet Click Beetle (*Limoniscus Violaceus*)

I have attempted to answer the questions (a) What is the difference in the conservation efforts? (b) Why do these differences occur?

The International Union for Conservation of Nature (IUCN) has designated species who are believed to be in danger into 6 categories; Least Concern, Near Threatened, Vulnerable, Endangered, Critically Endangered and Extinct in the Wild. The two species chosen are both classified as Endangered on the IUCN Red List, thus they are equally in need of conservation in the eyes of an organisation that is respected worldwide. This makes the comparison of conservation efforts valid in terms of necessity for conservation.

The topic of conservation is relevant to modern day Earth as it is estimated that if the current pace of human-caused global habitat loss continues, many habitats and associated species will be wiped out by 2080 (Schmitz, 2007). Not only is it relevant as it is an imminent issue but there are many varied benefits of conservation. Conserving species can be beneficial for humans as crops can be protected from pests without the use of pesticides, for example ladybirds eating aphids which are pests on plants (Rutherford, 2009). Some insects act as pollinators for crops such as bees pollinating fruit and vegetable crops.¹ Also productivity can be increased with the help of beetles and worms to aerate soil by aiding aerobic processes such as decomposition which releases nutrients essential to the growth of the crop. In addition it gives more opportunities for undiscovered useful natural products to be found such as medicines, for example quinine which originates from the cincona tree found in South America helps to treat malaria.² Most importantly the relevance of the issue of conservation is that the generations that come after us have the right to view the wonderful creatures of the world in their natural habitat.

Looking more specifically at the research question itself it is significant as it seems there is much more focus on conserving large mammals than smaller insects, when they contribute to the well-being of an ecosystem just as much. It is important to answer this research question as it will show that not enough is being done to conserve insects that are intrinsic to the health of an ecosystem.

¹ <http://www.sciencedaily.com/releases/2008/09/080915122725.htm> 12/10/11

² <http://rainforests.mongabay.com/10drugs.htm> 21/10/11

Background of Each Species

Understanding the ecology of each species is important because it puts the conservation strategies in context and helps to analyse the conservation strategies.

Violet Click Beetle

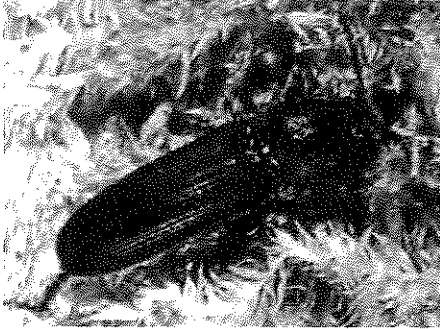


Figure 1.

Limoniscus Violaceus is a saproxylic beetle, meaning that it is dependent, at some point during its life cycle, on dead or dying wood (Siitonen, 2001). It is very rare, known populations are found intermittently throughout Europe. Within England *L. violaceus* has been found in Windsor Forest of Berkshire and Bredon Hill and Dixton Hill in the north Cotswolds (Alexander, 2009). Generally it inhabits older trees with heartwood decay (Alexander, 2009). The larvae can be vegetarian or carnivorous (Chinery, 2007) and ingest a large variety of natural material.³ There have been sporadic sightings of single adults on hawthorn blossom in England so it has been assumed that the nectar or pollen maybe beneficial to them.⁴ The biggest threat to *L. violaceus* is loss of habitat. Where there are known populations, old trees are being lost but no new trees are being planted.⁵

The total number of the species is unknown.

³ http://www.ptes.org/files/498_violet_click_beetle_fact_sheet_for_emailing.pdf 05/05/11

⁴ http://www.ptes.org/files/498_violet_click_beetle_fact_sheet_for_emailing.pdf 05/05/11

⁵ <http://www.iucnredlist.org/apps/redlist/details/157572/0> 17/05/11

Bornean Orangutan



Figure 2

P. Pygmaeus is the world's largest arboreal mammal at over 100kg (Ghazoul and Sheil, 2010). The island of Borneo, (Figure 1) Southeast Asia is made up of three countries, Brunei, Indonesia and Malaysia. Indonesia consists of East, West and Central Kalimantan whilst Malaysia consists of Sabah and Sarawak. *P. Pygmaeus* are found in 306 scattered areas within the island, mostly in Central Kalimantan and Sabah, with lesser populations in West and East Kalimantan and Sarawak (McConkey, 2005). *P. Pygmaeus* inhabit rainforests dominated largely by the mast fruiting tree family, the Dipterocarpaceae (McConkey, 2005) and are rarely found above altitudes of 800m.⁶ The diet of the *P. pygmaeus* consists of over 500 plant species, of which over 60% is fruit (Weston, 2009), making them frugivorous. *P. pygmaeus* play an essential role within the ecosystem as seed dispersers as they defecate the seeds several days after ingestion. Such seeds could be moved 800m from the parent tree (McConkey, 2005). The major threats facing *P. pygmaeus* are fire and illegal logging, habitat fragmentation, hunting and the pet trade.

The total number of the species is between 45,000 and 69,000.⁷

⁶ [http://www.orangutan.org.uk/downloads/factsheet 2 - the orangutan.pdf](http://www.orangutan.org.uk/downloads/factsheet%20-%20the%20orangutan.pdf) (18/05/11)

⁷ <http://www.iucnredlist.org/apps/redlist/details/17975/0> (11/10/11)

Map of the
Island of Borneo



Information sourced from UNEP-WCMC and IUCN (14/11/10)

Figure 3: Map of Borneo

Methods of Investigation

My research question has been investigated in four different ways.

1. The opinions of the general public have been examined through a questionnaire (Appendix I). This is important to the analysis of the research question as it is the public who donate most of the money used to assist endangered species, this claim is supported through the statistic that in the year 2010 WWF received 38% of their revenue from members and donors. As it is worldwide conservation organisations like WWF who can make a difference to the existence of an endangered species, this will enable a comparison of the conservation efforts of the two species to be made as financial donations, to a certain degree, enable conservation effort.

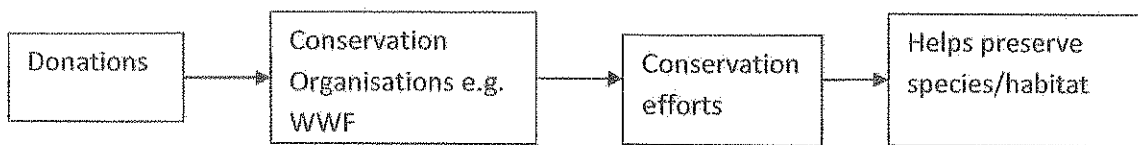


Figure 4

2. An analysis of the number of mammal and insect species that have "endangered" status has been presented via the collection of secondary data from the IUCN website. This has been done to discover if the effort put into conserving *P. pygmaeus* and *L. violaceus* is perhaps consistent with a wider picture, where mammals are more recognised (fairly or unfairly) as being in need of conservation.
3. The physical conservation efforts and spending on each species has been researched via the collection of secondary data through various sources. This allows for a direct comparison of conservation efforts. The following data has been gathered:
 - Location of known populations.
 - How much land is protected to aid the continuation of the species.
 - Future plans to help protect each species.
 - How many conservation organisations, governmental and non-governmental, are involved or dedicated to helping the species.
 - How much money is donated, from governments and the public, each year to help the species.
 - How much legislation has been implemented to help to protect the species.
 - How many members of the general public pay to go on a working conservation holiday each year for the species.
4. The threats to each species have been explored via the collection of secondary data from a range of sources. This data enables "an analysis of conservation effort in relation to threat". It may be that if one species has more threats to its survival then more conservation efforts for that species will be needed.

The questionnaire and the research of the conservation efforts are investigating what the differences in conservation efforts between the species are. The analysis of the number of mammal and insect species that have "endangered" status and the exploration of threats are investigating why these differences may occur.

To gather the information required journals and scientific papers were referred to as much as possible. Most of the sources from which information was cited are associated with prestigious organisations such as the International Union for Conservation of Nature (IUCN), the United Nations Environment Programme (UNEP) and the World Wide Fund for Nature (WWF), or published by respected university publishers, for example Oxford University Press. The material found in books has been deemed reliable as they have been published by reputable publishers, they use scientific language in the right context showing that the author is knowledgeable on the subject and, cite other authors which demonstrates that they have read around the subject. Also, although it is hard to accredit a website only trustworthy sources were selected, such as those of respected organisations e.g. IUCN, or of organisations committed to conserving each species. Regarding data on *L. violaceus* it is such a rare beetle that little is known about it, so very little information is available, this meant that all the information that was found only concerned populations in England. Although the rare nature of *L. violaceus* compromised the findings of specifics, a very informative paper within the "Proceedings of the 5th Symposium and Workshop on the Conservation of Saproxylic Beetles" was discovered. As the paper had been peer-reviewed I deemed it a trustworthy source. Any additional details were cited from the People's Trust for Endangered Species (PTES) website, within which the Worcestershire Biodiversity Action Plan was retrieved, or Laura Bowers who is member of staff at PTES and was heading the efforts to conserve *L. violaceus*. As PTES is a government funded organisation and is staffed by scientists they were trusted to give correct details.

Investigation

Questionnaire

Method

The questionnaire was emailed to 60 people between the ages of 16 and 19. The first 30 males and 30 females who replied were used as data sources, these measures were used to control the variables of age and sex. The raw data is contained in Appendix II.

Analysis of responses

Question 1 – How much would you pay to go on a working conservation holiday dedicated to species?

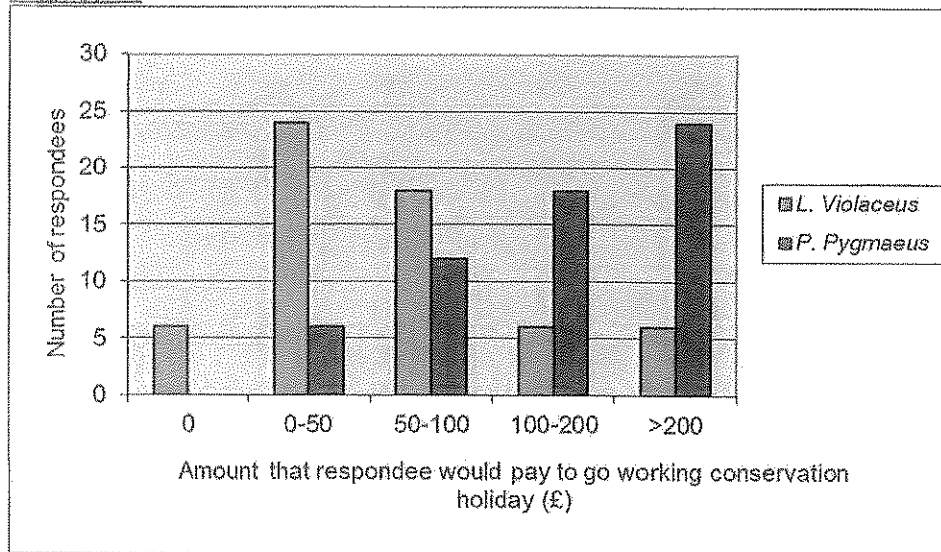


Figure 5: Column chart showing the answers from question 1

For calculating the mean the mid value of the second, third and fourth categories will be taken, as they are a range, and the fifth category value will be treated as £200.

Species	Mean amount responsee would pay to go on a working conservation holiday (£)
<i>L. violaceus</i>	68
<i>P. pygmaeus</i>	143

Table 1: Table showing mean amounts for each species

Question 2 – How much would you donate to help conserve each species?

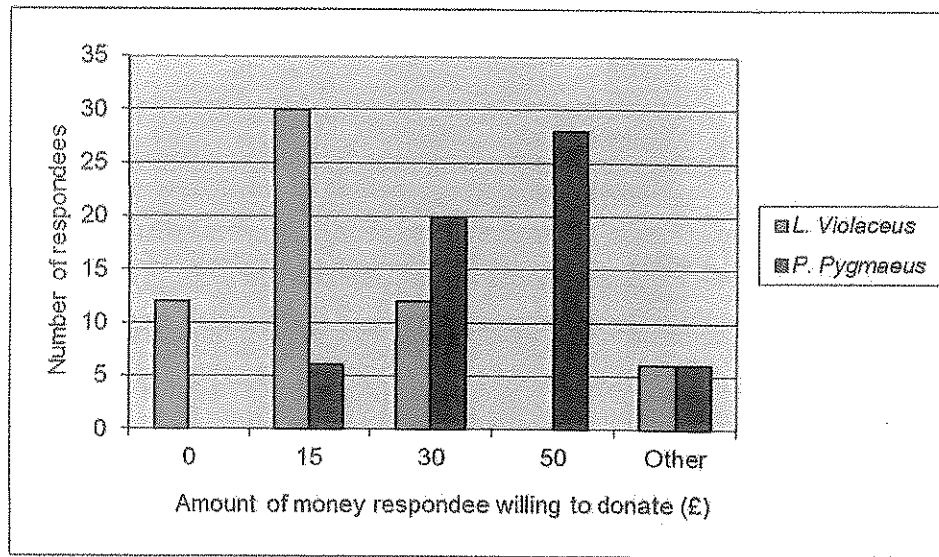


Figure 6: Column chart showing the answers from question 2

For calculating the mean the category classified as "Other" will be ignored and therefore the number of respondents that opted for "Other" will be subtracted from 60 before the last stage of the calculation.

Species	Mean amount of money respondent would be willing to donate (£)
<i>L. violaceus</i>	14
<i>P. pygmaeus</i>	39

Table 2: Table showing mean amounts for each species

Question 3 – Which species would you save from extinction and why?

L. violaceus

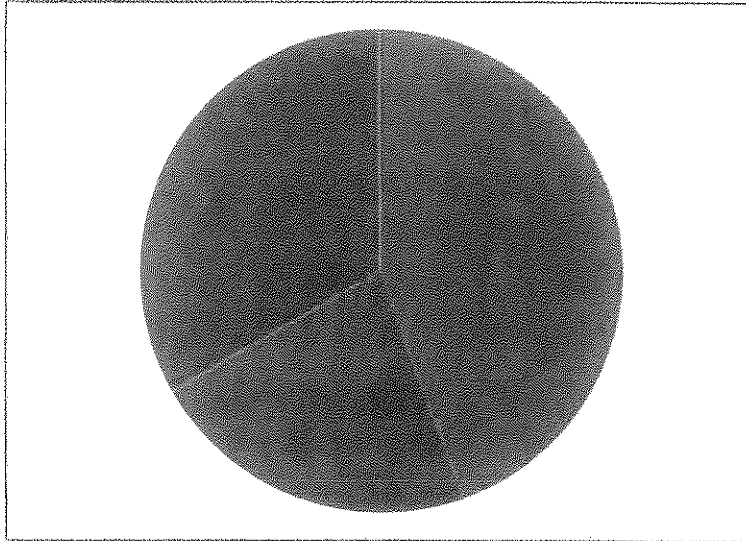


Figure 7

Because they're important to the ecosystem to which they belong

Because they're interesting to observe

Other

P. pygmaeus

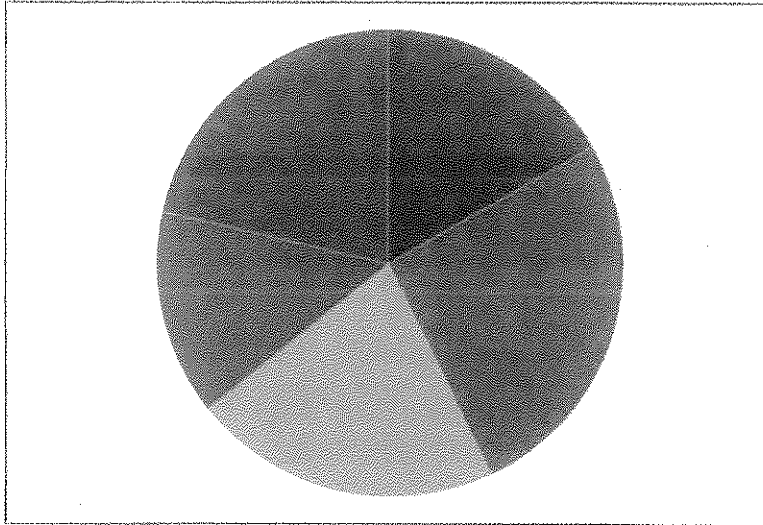


Figure 8

Because they look cute

Because they're important to the ecosystem to which they belong

Because they're entertaining

Because they're interesting to observe

Other

Mann Whitney U Test

Once the results had been collected Question 2 was examined to see if the difference in money donated to each species was significant or just by chance. Question 2 was used as it is the public who donate a lot of the money which is utilised to assist endangered species. Also if the difference is significant it may give some explanation as to why one species may have greater conservation efforts than the other, as if there was more funding then more work could be done to help that species.

A Mann Whitney U test was performed using the program SPSS. If there are a high number of tied ranks the test will be extended to a Z Test. It is a one tailed test.

Hypotheses

H_0 = There is no difference in the attitudes of the public towards the amount of money they would donate to each species - any observed differences are due to chance.

H_1 = There is a difference in the attitudes of the public towards the amount of money they would donate to each species – any observed differences are significant.

The test had to be extended to a Z test due to the high number of tied ranks.

Value from the table = 1.645 at 5%

Value from the Mann Whitney Z Test = 34.53

$34.53 > 1.645$ therefore H_1 is accepted.

There is a significant difference in the attitudes of the public towards the amount of money they would donate to each species.

Evaluation of Questionnaire

A flaw of this method of investigation is that as only people between the ages of 16 and 19 were questioned, they all have a similar back ground and therefore similar world view. This means that opinions of the whole of the public weren't shown, only this age range. However this age range were questioned because it was the age range to which there was the most access to and therefore the most amount of responses would be reciprocated, giving more data to be analysed. Also, it would have been useful to question people aged 45-64 as research has shown that this is the age group who gave the most types of support to WWF, (WWF, 2011) the largest wildlife organisation in the world. This would then have allowed me to additionally assess my research question from the viewpoint of a different age group in society.

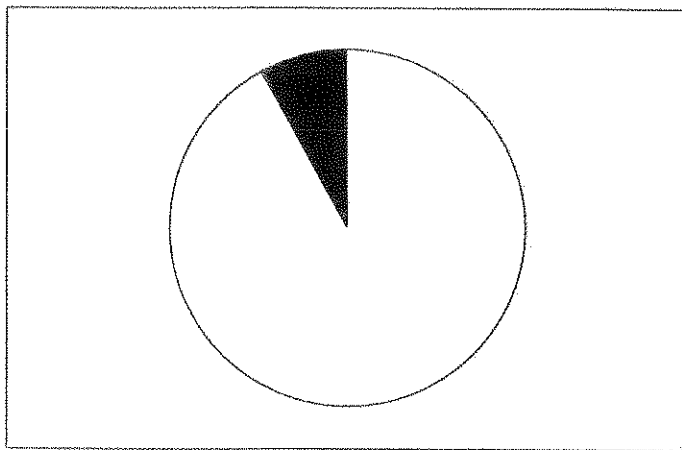
Number of Insect and Mammal Species Which Have "Endangered" Conservation Status

Table showing the total number of species and the total number of endangered species

	Mammal	Insect
Total number of species	5162	1801600
Total number of endangered species	450	166

Table 3

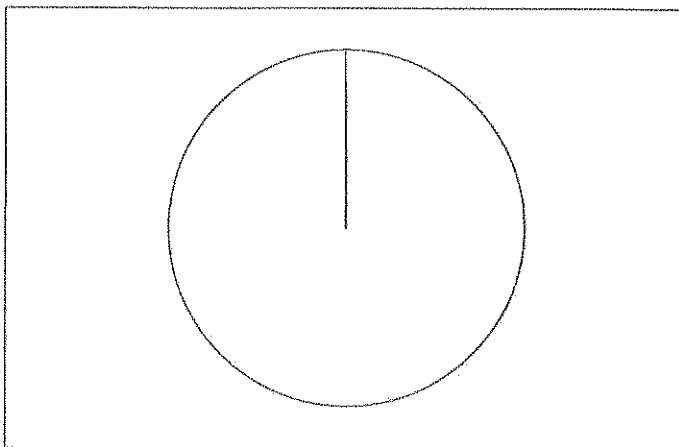
Mammals



Not endangered species	
Endangered species	

Figure 9

Insects



Not endangered species	
Endangered species	

Figure 10

Physical Conservation Efforts and Spending on Each Species

Table comparing conservation efforts of each species

	<i>L. violaceus</i>	<i>P. pygmaeus</i>
Locations of known populations	-England - Windsor Forest of Berkshire and Bredon Hill and Dixon Hill, North Cotswolds	- Central Kilamantan and Sabah.
Protected areas	<ul style="list-style-type: none"> - All three sites in England = Special Areas of Conservation - Priority Species under the UK Biodiversity Action Plan - Habitat type = Priority Habitat - Large part of Windsor Estate = Site of Special Scientific Interest 	<ul style="list-style-type: none"> - 6.9% of Borneo is protected by National Parks - 9% of Kalimantan under some form of protection - 8% of Sarawak is totally protected - 2% of Sabah is conservation forest
Amount of population outside protected areas	- Unknown	- 75% in Kalimantan
Future plans to help protect the species	<ul style="list-style-type: none"> - Gain protection for potential habitats. - Funding bid to support conservation of the species 	- WWF is working towards conserving 220,000 km ² of Borneo
Conservation organisations	1	>40
Estimated conservation spend per year	> £4000	> ≈ £4.6 million
Legislation and enforcement	<ul style="list-style-type: none"> - It is listed on Annex II of the EU Habitats Directive - In the British Red Data Book as Endangered - Illegal to collect this species since 1988 - Species Action Plan was developed in 1996 	<ul style="list-style-type: none"> - Fully protected in Indonesia and Malaysia. - Listed on Appendix I of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)⁸ - 5 years prison sentence and a fine of up to IDR100 000 000 (USD12 000 at 2004 rates) can be enforced

⁸ <http://www.iucnredlist.org/apps/redlist/details/17975/0> (27/08/11)

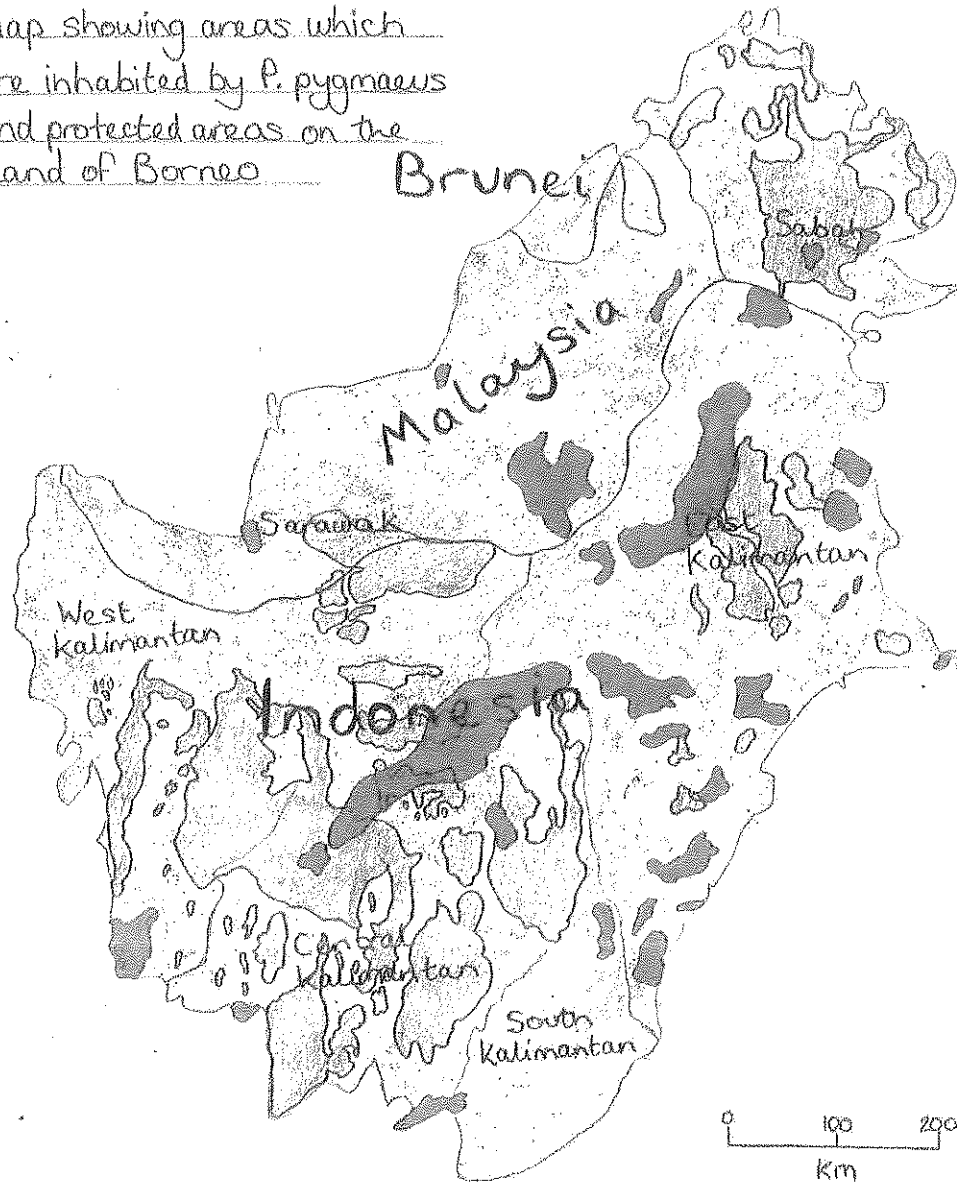
	<i>L. violaceus</i>	<i>P. pygmaeus</i>
Ecotourism	- Public can volunteer to maintain the countryside via National Trust but not directly <i>L. violaceus</i>	- Many opportunities, for example 2 weeks for the price of £1250. ⁹

Table 4

Full data table in Appendix III.

⁹<http://www.responsibletravel.com/holiday/4976/orangutan-volunteering-in-Borneo> (28/08/11)

Map showing areas which
are inhabited by *P. pygmaeus*
and protected areas on the
Island of Borneo



- — Where *P. pygmaeus* are found
- — Protected areas — — National Boundaries

Information sourced from UNEP-WCMC and IUCN (14/10/11)
and [http://mappery.com/map-of/Borneo-Protected-Areas-Map\(14/10/11\)](http://mappery.com/map-of/Borneo-Protected-Areas-Map(14/10/11))

Figure 11

Exploration of the Threats of Each Species

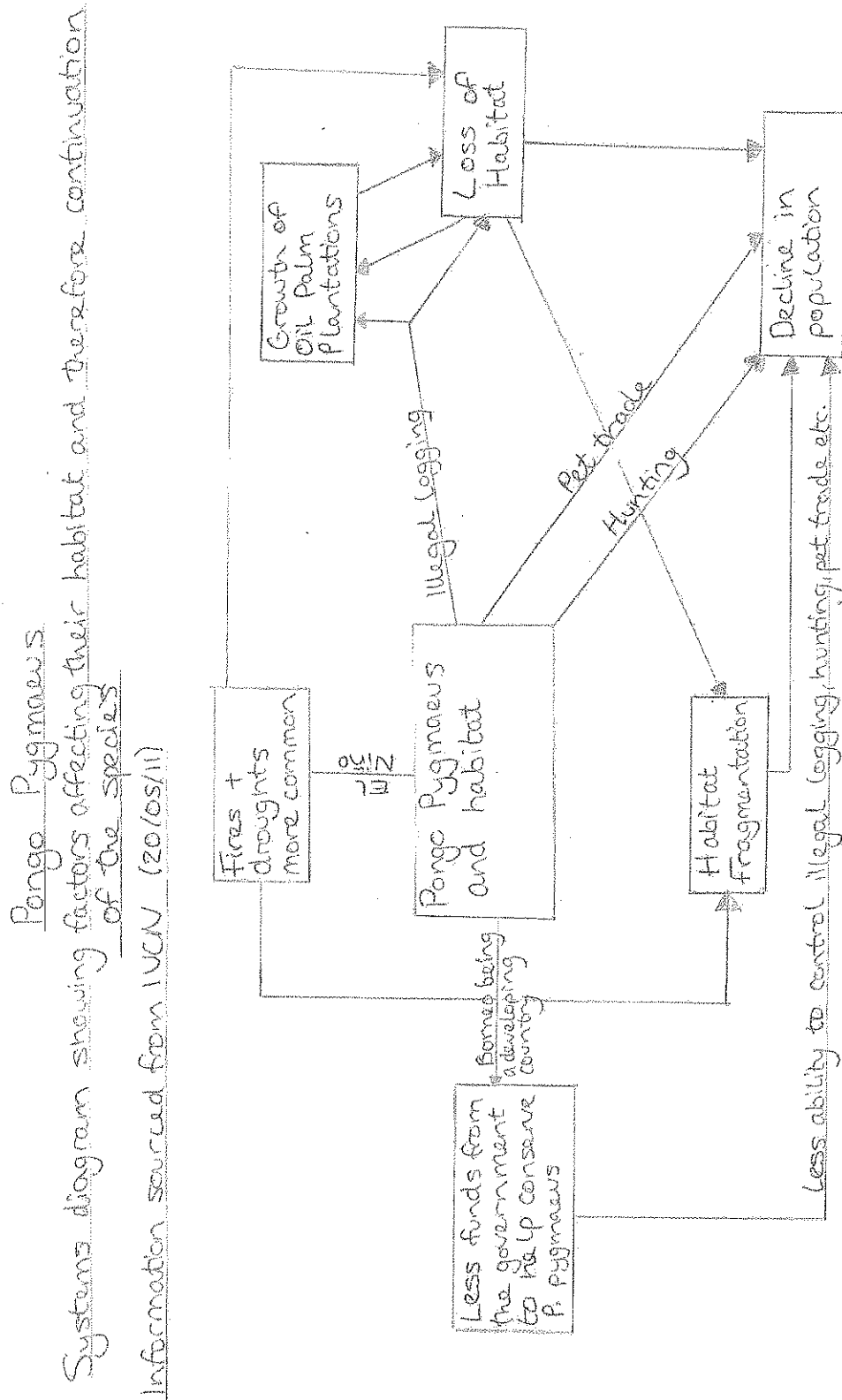


Figure 12

Limnolus Violaceus

Systems diagram showing factors affecting the continuation of the species

Information sourced from the Worcestershire Biodiversity Action Plan

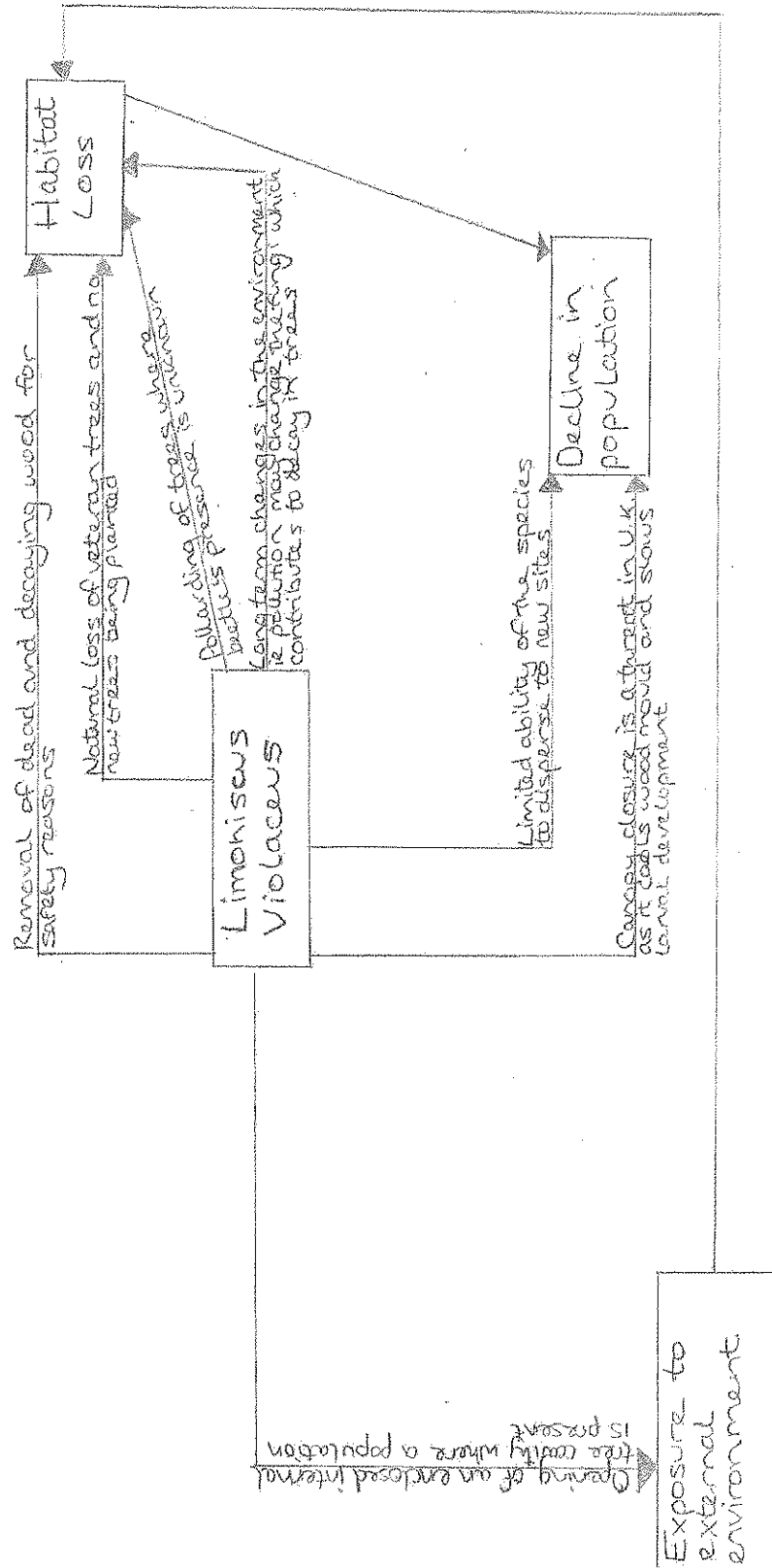


Figure 13

Discussion

Throughout this paper there has been a consistent pattern – most of the data presented is in favour of conserving *P. pygmaeus* more than *L. violaceus*, this agrees with my argument that the public are more sympathetic towards *P. pygmaeus*.

Questionnaire

Donations

The argument is supported through the fact that overall the people questioned would donate a total of £870 towards *L. violaceus* whilst £2,072 would be donated towards *P. pygmaeus*. Also that significantly more people would donate higher amounts of money towards *P. pygmaeus*. This may be because of the paradigms people possess. As we are exposed to conservation issues from early ages, such as the WWF logo which is internationally recognised, we are aware of what species conservation organisations use to promote conservation. These species then become synonymous with conservation issues.

Species used to promote conservation are known as flagship species, they are usually iconic and therefore recognisable and are used as a focus point for raising awareness and funds for conservation.¹⁰ The term keystone species is also used. These species are those which have a crucial role in a habitat or ecosystem meaning that the decline of them would cause harm to the habitat or ecosystem to which they belong. At a broader scale the loss of these species may have a significant effect.¹¹ *P. pygmaeus* act as seed dispersers by excreting seeds away from the parent tree, so are included in this category. As *P. pygmaeus* are both a flagship and keystone species they are more important to promoting conservation than a species which belonged to just one of these categories. This then means conservation organisations are more willing to use the species to raise money so they have become an intrinsic part of our paradigm of conservation, this in turn means that we are more familiar with *P. pygmaeus* than *L. violaceus* and therefore more likely to favour that species. This claim that being more familiar with a species and so preferring it is supported by data collected in Switzerland.¹² A study was done to assess opinions towards various potential flagship species, students from primary, grammar and vocational schools were surveyed. They were shown a photograph and were asked to identify the species and then say how likable or unlikable they were. It was found that affinity ratings increased with identification of the species.

¹⁰ [http://wwf.panda.org/what we do/ endangered species](http://wwf.panda.org/what_we_do/ endangered_species) (13/10/11)

¹¹ <http://www.worldwildlife.org/species/flagship-species.html> (13/10/11)

¹² <http://www.conservationmaven.com/frontpage/how-to-choose-a-flagship-species-for-conservation.html> (13/10/11)

Saving a Species from Extinction

The result of the study done in Switzerland also ties in with the statistic that we share 97% of our DNA and similar physical characteristics with *P. pygmaeus*, this enables humans to identify with the species more and so in turn we feel more affinity for them than *L. violaceus*. This may explain why when asked which species they would save from extinction, 42 out of 60 respondents chose *P. pygmaeus*.

Conservation Efforts

The majority of the comparisons between conservation efforts also support my argument.

Conservation Spend

The conservation spend for *P. pygmaeus* was estimated at approximately £4.6 million compared to an estimate of over £4000 for *L. violaceus*. This reflects the views of the respondents in that the mean donation for *P. pygmaeus* was £39 whilst for *L. violaceus* it was £14. As the conservation spend includes donations from the public the large difference in the amounts shows that people are more sympathetic towards *P. pygmaeus*. The fact that *P. pygmaeus* is a flagship and keystone species may also contribute to the large difference as a body of people, for example a corporation or a government, would be more willing to donate money to a well publicised cause instead of an unknown beetle species because it would benefit their public image. For example the U.S. Senate expected the United States Agency for International Development (USAID) to give \$2,500,000 to non-governmental organisations for activities to save the orangutan from extinction in the year 2004 (Summary of Total Budget Authority of the U.S. Senate).

Ecotourism

The ecotourism data revealed that there were many more opportunities to help conserve *P. pygmaeus* than *L. violaceus*. This agrees with my argument because if there was no demand for working conservation holidays that helped *P. pygmaeus* there wouldn't be any. The demand shows that the public are sympathetic towards their plight and want to help them. Another reason why there may not be any working conservation holidays to help *L. violaceus* is because there isn't even the opportunity in the first place. Maybe if the opportunity did become available then it would become popular.

Conservation Organisations

The number of organisations dedicated to *P. pygmaeus* was estimated at over 40, there was only one dedicated to *L. violaceus*. This corresponds with my argument in that hundreds of people around the world have made the effort to establish and continue organisations that help to conserve *P. pygmaeus*, many of them non-governmentally funded, showing that they are sympathetic towards *P. pygmaeus*. Whilst on the other hand there is a small Biodiversity Action Plan group, funded by the English government, consisting of a volunteer from Windsor, a post doctorate researcher from Royal Holloway University and two independent entomological consultants who are employed by People's Trust for Endangered Species (PTES) (Laura Bowers, PTES).

Protected Areas

The only conservation effort which didn't correspond with my argument was the amount that each species was protected. All the populations of *L. violaceus* were protected whilst 75% of *P. pygmaeus* were outside of protected areas. However the reason for this is because there are only three known populations of *L. violaceus* which is a lot easier to protect from harm than the many populations of *P. pygmaeus*. Also the habitat of *P. pygmaeus* is wanted by Oil Palm companies whilst there is no competition for the land that *L. violaceus* inhabits.

Pie Charts Showing the Number of Insect and Mammal Species Which are Classified as "Endangered"

The pie charts showed that considerably more mammal species were classified as "endangered" than insect species, even though the overall number of insect species was far greater. The result of the pie charts shows that the findings of this paper, that *P. pygmaeus*, a mammal, is more conserved than *L. violaceus*, an insect, is consistent with the wider picture throughout the world. However this may be because the ease of identifying and locating mammals, and therefore classifying them, is much more than that of insects due to their physical size.

Exploration of Threats

Through the exploration of factors that threaten each species it was noticed that there were more threats for the *P. pygmaeus* than *L. violaceus*. This shows that factors affecting *P. pygmaeus* have been recognised and so more ways to combat the threats (conservation efforts) have been devised. The reason why there are less threats towards *L. violaceus* may be because they are very rare and consequently there is very little data about their needs for habitat, reproduction and feeding, meaning that all the threats towards them cannot be acknowledged and therefore combated. Also their rarity stops possible threats, such as harm done by insecticides, being identified. On the other hand, the threats towards *P. pygmaeus* can be plainly seen. One reason for this is because they are large mammals so can be monitored easily and therefore needs for their well-being known.

Even though it is unjust that there is more effort to conserve *P. pygmaeus*, as they both have the same right to be protected, it can be understood why it is so. This is because *P. pygmaeus* act as keystone species, so are needed in the ecosystem, but also, in the process of conserving *P. pygmaeus* other species, fauna and flora, can be protected as well. This approach could be applied to *L. violaceus*, but it is perhaps more essential for Borneo as much of its fauna and flora are endemic species. Endemic species are unable to survive in any other habitats but their own. As seen in Figure 6 nearly half of the mammals and a quarter of the reptiles of Borneo are endemic.

	Birds	Mammals	Reptiles	Fresh-water Fish	Selected Plant Taxa
Number of native species	420	210	254	368	900
% of endemic species	6	48	24	38	33

Figure 6: Table showing the percentage of endemic species found in Borneo.

Source: (Kapos & Caldecott cited in Nellemann et al., 2007, p12)

In addition to the conservation of other fauna and flora the habitat of the rainforest itself can be preserved. This is important as there is a lot less rainforest than temperate woodland, *L. violaceus*' habitat.

Though the conservation of *P. pygmaeus* assists in the conservation of endemic species of Borneo another view could be held that humans are doing this to benefit themselves. If a systems diagram of the inputs and output for each species is examined it can be seen that there are a larger collection of outputs that are beneficial to humans from the conservation of *P. pygmaeus* than *L. violaceus*.

Inputs and Outputs from the Conservation of *P. pygmaeus*

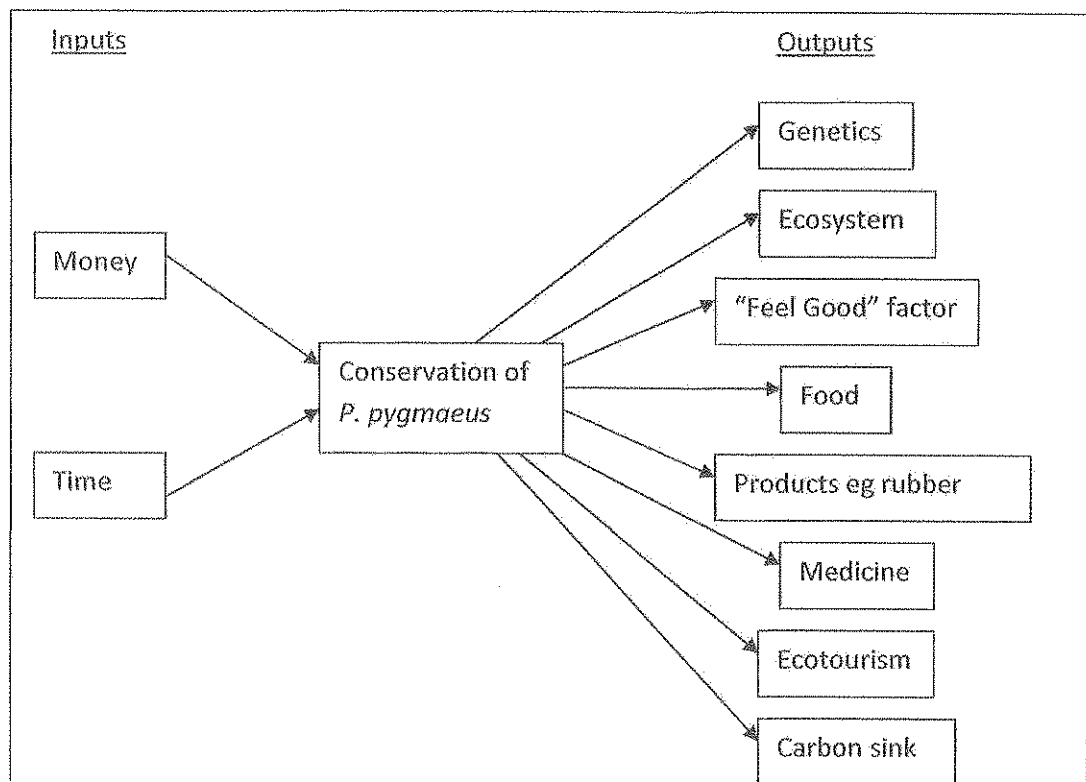


Figure 14

Inputs and Outputs from the Conservation of *L. violaceus*

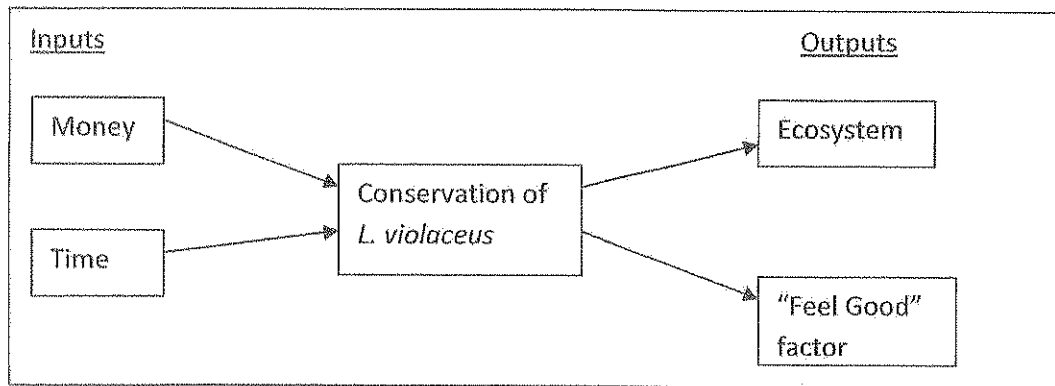


Figure 15

- 1. The good knowledge needed in cost calculation
- 2. The need in developing research and conservation strategy
- 3. The need in developing and log unit approach
- 4. The need in developing and log unit approach

Conclusion

In comparing the conservation of *P. pygmaeus* and *L. violaceus* I aimed to determine what the differences were and explain why these differences may occur. The greatest difference is the larger conservation efforts for *P. pygmaeus*. This is because as *P. pygmaeus* is a mammal it is much easier for data about them to be recorded and therefore used as a resource in combating their decline. This conclusion is further supported by the data showing that a much larger proportion of mammals are classified as endangered compared to insects. Furthermore the attitudes of the public were more inclined to favour *P. pygmaeus*, which in turn helps to initiate and maintain conservation efforts. This is thought to be because of the iconic status of *P. pygmaeus* and the connection humans feel towards them due to similar physical characteristics. However *P. pygmaeus* also faces more threats than *L. violaceus* so this could influence the conservation effort. It is unclear to what extent the human gain from the resources of each habitat is linked to conservation.

A gap in the research of this paper is that data on the status of *L. violaceus* in other countries was not accessible. If it had been, this would have given a fairer comparison of conservation efforts, as the conservation efforts of three countries of Borneo were being compared with the conservation efforts of one. This gives rise to the question, if all the data were accessible, would the results have turned out differently?

To further the investigation the full extent of the conservation efforts for each species could be fully quantified and compared. Furthermore the amount and value of the resources from each habitat could be quantified to help assess if this influences conservation. It would also be interesting to investigate the conservation effort of an insect such as the Honey Bee (*Apis mellifera*). They are in steep decline but unlike *L. violaceus* are recognised by the public, and are also fundamental to humans economically as crop pollinators.

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Acknowledgments

These sources were invaluable in contributing to my understanding of the topic. Thank you.

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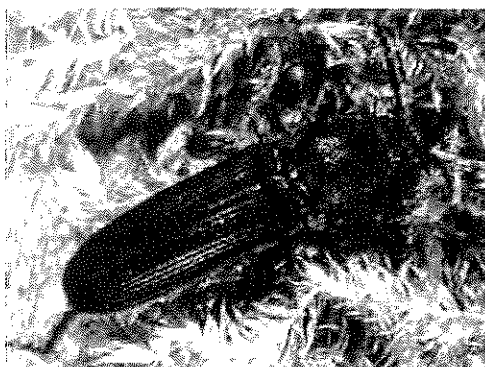
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Appendix I: Questionnaire



Violet Click Beetle



Bornean Orangutan

Please mark your answer with "X"

- 1 How much would you pay for each species to go on a working conservation holiday?

		£0	£0-50	£50-100	£100-200	>£200
Violet Click Beetle						
Bornean Orangutan						

- How much would you donate to help conserve each species?

- 2

		£0	£15	£30	£50	Other
Violet Click Beetle						
Bornean Orangutan						

- 3 Which species would you save from extinction and why?

Violet Click Beetle	
Bornean Orangutan	

Because they look cute	
Because they're important to the ecosystem to which they belong	
Because they're entertaining	
Because they're useful to humans	
Other	

- 4
- | | |
|--------|--|
| Male | |
| Female | |

Appendix II: Results from questionnaire

1 How much would you pay for each species to go on a working conservation holiday?

	£0	£0-50	£50-100	£100-200	>£200
Violet Click Beetle	6	24	18	6	6

	£0	£0-50	£50-100	£100-200	>£200
Bornean Orangutan		6	12	18	24

2 How much would you donate to help conserve each species?

	£0	£15	£30	£50	Other
Violet Click Beetle	12	30	12		6

	£0	£15	£30	£50	Other
Bornean Orangutan		6	20	28	6

3 Which species would you save from extinction and why?

Violet Click Beetle	18
Because they look cute	
Because they're important to the ecosystem to which they belong	8
Because they're entertaining	
Because they're interesting to observe	4
Other	6

Bornean Orangutan	42
Because they look cute	7
Because they're important to the ecosystem to which they belong	11
Because they're entertaining	9
Because they're interesting observe	6
Other	9

4 Male	30
Female	30

Appendix III: Full data table comparing conservation efforts

	L. Violaceus	P. Pygmaeus
Locations of known populations	- Within England - Windsor Forest of Berkshire and Bredon Hill and Dixton Hill in the north Cotswolds (Alexander, 2009).	- Throughout Central Kilamantan and Sabah.
Protected areas	<ul style="list-style-type: none"> - All three sites where it is found in England have been made Special Areas of Conservation (Alexander, 2009). - Priority Species under the UK Biodiversity Action Plan (Alexander, 2009). - Its habitat type- Wood Pastures and Parklands- is a Priority Habitat for conservation action (Alexander, 2009). - A large part of Windsor Estate is designated as a Site of Special Scientific Interest (Laura Bowers, PTES). 	<ul style="list-style-type: none"> - In total 6.9% of Borneo is protected by National Parks, eg Tanjung Putting National Park which covers 3040 km²¹³ though this figure does not include any other type of conservation area (Rautner and Hardiono, 2005). - 9% of Kalimantan is under a form of protection (Rautner and Hardiono, 2005). - 8% of Sarawak is totally protected; collecting forest produce, fishing and hunting are banned in these areas (Rautner and Hardiono, 2005). - 2% of Sabah is conservation forest (Rautner and Hardiono, 2005).
Amount of population outside protected areas	- Unknown, potentially many unidentified populations outside of protection.	- 75% of P. Pygmaeus populations in Kalimantan occur outside protected areas (Sugardjito and Adhikerana, 1994). Figure

¹³ <http://www.orangutan.org/rainforest/tanjung-puting-national-park> 27/08/11

Future plans to help protect the species	<ul style="list-style-type: none"> - Gain protection for potential habitats. - Hoping to place funding bid for several species including <i>L. Violaceus</i>. 	<ul style="list-style-type: none"> - WWF has revealed plans to work with the three countries of Borneo to try and conserve 220,000 km².¹⁴
Conservation organisations	<ul style="list-style-type: none"> - People's Trust for Endangered Species (PTES) have a Biodiversity Action Plan group including a volunteer from Windsor, a post doctorate researcher from Royal Holloway University and two independent entomological consultants (Laura Bowers, PTES). 	<ul style="list-style-type: none"> - Numerous eg Orangutan Conservation Species Programme (Doyen, 2010), The Orangutan Conservancy, Borneo Orangutan Survival Foundation and Orangutan Foundation International (Which et al. 2009).
Estimated conservation spend	<ul style="list-style-type: none"> > £4000 - Over the last 3 years PTES have received £3200 per annum from Natural England (a government funded conservation organisation) to fund research but this stops at the end of 2011 (Laura Bowers, PTES). - No money donated directly to <i>L. Violaceus</i> but some of the money donated to PTES as a whole is used to help conserve <i>L. Violaceus</i>. 	<ul style="list-style-type: none"> > \$6.5 million - In 2004 USAID (United States Agency for International Development) were expected to give \$2,500,000 for continued support through non-governmental organisations for activities to save the orang-utan from extinction (Summary of Total Budget Authority of the U.S. Senate). - Development Alternatives Inc. is part of a Conservation Service Programme to protect Orangutans in Indonesia, they expect to produce \$4 million annually for orangutan conservation in the

¹⁴ [http://wwf.panda.org/what we do/where we work/Borneo forests/](http://wwf.panda.org/what_we_do/where_we_work/Borneo_forests/) 28/08/11

		region by 2009. ¹⁵
Legislation and enforcement	<ul style="list-style-type: none"> - It is listed on Annex II of the EU Habitats Directive,¹⁶ meaning conservation of the species requires the designation of special areas of conservation.¹⁷ - Included in the British Red Data Book as Endangered (Shirt 1987). - Illegal to collect this species since 1988 - Species Action Plan was developed in 1996 and a Species Recovery Programme was initiated by English Nature¹⁸. 	<ul style="list-style-type: none"> - Fully protected in Indonesia and Malaysia. - Listed on Appendix I of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)¹⁹ ie threatened with extinction and CITES prohibits any international trade of the species.²⁰ - Under Indonesian law if you are caught capturing, killing, possessing or trading a specimen of the species a 5 years prison sentence and a fine of up to IDR100 000 000 (USD12 000 at 2004 rates) can be enforced (Nijman, 2005).
Ecotourism	<ul style="list-style-type: none"> - The public can volunteer to maintain the countryside via National Trust and therefore, potentially, maintain L. <i>Violaceus</i>' habitat, though no conservation activities are available to help L. <i>Violaceus</i> directly if the public so wish. - Volunteer from Windsor working with PTES who is part of 	<ul style="list-style-type: none"> - "Prepare the food for the orangutans and other animals, clean out cages, build structures, toys, help with rehabilitation and maintain the orangutan building and quarantine area for the rest of the day." for 2 weeks for the price of £1250.²¹ - Can partake in "Wildlife Population Density Data

¹⁵ http://www.dai.com/work/project_detail.php?pid=164 27/08/11

¹⁶ <http://www.iucnredlist.org/apps/redlist/details/157572/0> 27/08/11

¹⁷ http://europa.eu/legislation_summaries/environment/nature_and_biodiversity/l28076_en.htm 29/08/11

¹⁸ <http://www.iucnredlist.org/apps/redlist/details/157572/0> 27/08/11

¹⁹ <http://www.iucnredlist.org/apps/redlist/details/17975/0> 27/08/11

²⁰ <http://www.cites.org/eng/app/index.shtml> 28/08/11

²¹ <http://www.responsibletravel.com/holiday/4976/orangutan-volunteering-in-P-Pygmaeusmeo> 28/08/11

	<p>their Biodiversity Action Plan group is as close as it gets to a working conservation holiday.</p>	<p>Collection: observe and record endangered wildlife, taking photographs, if possible, of the wildlife (focusing on pygmy elephants and orang-utans) for record and research purposes; Habitat Restoration: tree planting, nursery care and seedling generation, sapling maintenance, mulching & composting, water hyacinth clearing and tree growth data recording." for 12 days for £1195.22</p>
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²² <http://www.responsibletravel.com/holiday/5171/borneo-wildlife-volunteer-project> 28/08/11