The Rufford Small Grants Foundation

Final Report

Congratulations on the completion of your project that was supported by The Rufford Small Grants Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Chun Chia Huang
Project title	Changing the Face of Farmer-Wildlife Conflicts: the Economic Potential of Bat-discarded Coffee Beans in Southwestern Sumatra, Indonesia
RSG reference	9861-1
Reporting period	October 2011 until August 2012
Amount of grant	£6000
Your email address	chun-chia.huang@ttu.edu.tw
Date of this report	30th November 2012

1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
1. Evaluation of farmers' perception of wildlife			√	One interview was conducted with 16 farmers with assistance by University of Lampung (UNILA) and Wildlife Conservation Society- Indonesia Program (WCS-IP).
2. Species list of wildlife in coffee plantations			√	1. Five camera traps were used to monitoring wildlife activities in coffee plantations during between March and June 2012. 2. Mist nets were used to maximise the species list of fruit bats. 3. Additional mammalian species were recorded by observations of individuals and tracks in the field and from local people during interview.
3. Consumption of coffee berries by wildlife			√	Twenty coffee bushes were chosen for enclosure experiment of berry consumption assessment by wildlife between March and June 2012.
4. Economic value of bat-discarded beans		√		See question 2.

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

In the peak fruiting season (from mid March to Mid June), I tried to collect wildlife coffee beans using random transects and quadrates. However, both designs were biased in estimating production of the wildlife-discarded beans because animals discard beans non-randomly. The majority of wildlife beans were found under day and night feeding roosts, which were economic plants the farmers planted in addition to coffee. Those plants were grown near the boundary of plantations, edge of the plantations, or clumped in a small area in the plantations. The spatial patterns of the beans made the estimation of the bean production per area/plantation biased by because of the study design. I recommend that future researches focus on the plant species that wildlife use for feeding. Production of wildlife coffee beans per tree per unit time can be estimated by collecting beans manually or placing seed traps. There are two major advantages of this design compared with random sampling. First, the new design will be less biased because it can give a more precise measure of production per tree and can be used to estimate total bean production per plantation/unit area by multiplying the average production per plant by plant density for all plant roost species. Second, the design will be more cost and time effective in locating the majority of wildlife beans, which makes bean collecting more efficient for farmers.

3. Briefly describe the three most important outcomes of your project.

a. Identify wildlife-discarded beans and night feeding roosts for fruit bats

Coffee beans discarded by bats and tree squirrels were collected in coffee plantations in the Way Heni area from late March to early June 2012. The majority of wildlife beans found were discarded by bats (figure 1) and only a few was by squirrels (figure2). Only one civet guano of coffee beans was found along a trail before the survey period. Animals consumed mostly ripe berries and a few nearly ripe berries.

Bat-discarded beans were found beneath 21 plant species, including coffee. Except for coffee, the other 20 plant species with bat beans were defined as either day or night feeding roosts (documented by the presence of bats in the daytime) (table 1). Camera trapping photographs provide direct evidence that bats use some of the sites for feeding (figure 3, 4). Bat beans were mostly bare or had some chewed skin, or very few had pulp remains. No significant damage was found by bats to coffee beans. Faeces, plant skin, seeds and splits of coffee and other were usually found with bat beans under roosts (figure 5). Coffee seedlings found with bat beans beneath some night roosts indicated that bat repeated used sites for feeding across years (figure 6). Coffee consuming bat species were identified by either direct observation at day roosts or camera trapping on night roosts and coffee bushes (figure 8). All the bats observed belonged to genus *Cynopterus*, which were the most abundant phytophagous bats (including fruit bats and nectar bats) in the study area. Two species, *Cynopterus brachyotis* and *Cynopterus minutus*, were identified (table 1).

Bats used non-coffee plants (n = 100) more than coffee bushes for night feeding sites (n =10), which suggests that bats process coffee berries mostly at night feeding roosts rather than at coffee bushes. The most frequently used plant species for night feeding sites were *Terminalia cattapa*, *Lansium domesticum,* and *Durio* spp., which counted for 60% of the total night feeding sites (n =110). A side-study on the traits of the roost trees by a UNILA student, under this project, indicated that bats use plants with specific characteristics for night feeding roosts (Eka Sulpin Ariyanti, Elly L. R. Jazdzyk, and Chun-Chia Huang, unpublished data). The results showed that bats use night feeding roosts (n=100) of plants with a mean canopy height of 8.1 m (95% CI: 7.6-8.6 m), mean diameter at breast height (DBH) of 19.0 cm (95% CI: 17.1-20.8 cm), mean minimum canopy crown size of 2.5 m (95% CI: 2.3-2.7 m), and mean distance to the closest road of 25.2 m (95% CI: 21.5-31.0 m).

In contrast, squirrel-discarded beans were only found under coffee bushes. The squirrel beans were either bare or had remains of pulp and skin. Non-chewed skin pieces of coffee berries were found with squirrel beans. Noteworthy, squirrels sometimes damaged coffee beans when they processed berries with teeth. Damage to unroasted beans can significantly decrease the quality of coffee and should be considered if we plan to promote wildlife-discarded coffee.

Figure 1. The remains of coffee berries by bats found in coffee plantations of Way Heni area.

Figure 2. The remains of coffee berries by squirrels found in coffee plantations of Way Heni area.

Figure 3. A *Cynopterus* bat consumed a coffee berry at a night roost tree of *Mechelia campaka*.

Figure 4. A bat fed coffee berries at a Robusta coffee bush.

Figure 5. Splits and seeds of coffee and other plant species discarded by bats at a night roost.

Figure 6. Bat coffee beans and bats' faeces found at one night roost.

Table 1. Plant species under which bats discarded coffee beans at Way Heni village, Sumatra.

	English Name	Local name	Use by famers	Use by bats	Bat species
ANACARDKACEAE					
Mangifera sp.	mango	mangga	food	night feeding roost	-
ARECACEAE					
Cocos nucifera	coconut	kelapa	cash, food, packing	day roost	Cybr
ARECACEAE					
Areca catechu	areca nut	jambe	cash	night feeding roost	-
BOMBACACEAE					
Durio spp.	durian	durian	food, cash	night feeding roost	-
COMBRETACEAE					
Terminalia cattapa	tropical almond/ umbrella tree	Ketapan	timber	night feeding roost	-
Terminalia citrina	citrine myrobalan / black chuglam	belawan	timber	night feeding roost	-
EUPHORBIACEAE					
Hevea brasiliensis	rubber	Karet	cash	night feeding roost	-
FABACEAE					
Archidendron bigeminum	-	jering	timber, food	night feeding roost	-
Erythrina sp.*	coral tree/ sunshine tree	dadap	supporting piper growth	day roost	Cysp
Pithecellobium jiringa	-	jenkol	cash, food	night feeding roost	-
LAURANCEAE					
Persea americana	avocado	apokado	cash, fruit	night feeding roost	-
Litsea spp.	bollywood	medang	timber	night feeding roost	-
MAGNOLIACEA					
Mechelia campaka	champak	cempaka	timber	night feeding roost	Cysp
MALVACEAE					
Theobroma cacao	cocoa	coklat	cash	night feeding roost	-
MELIACEAE					
Lansium domesticum	langsat/lanzones	duku	fruit & cash	night feeding roost, day roost	Cysp
MUSACEAE					
Musa spp.	banana	pisang	cash, food , packing	day roosts	Cymi
MYRTACEAE					
Euginia sp.	-	gelam	timber	night feeding roost	-
PIPERACEAE					
*Piper nigsum**	piper	lada	cash	day roost	Cysp
RUBIACEAE					
Coffee canephora	robusta coffee	kopi	cash, drink, timber	night feeding site	Cysp
SAPINDACEAE					
Nephelium lappaceum	rambutan	rambutan	food	night feeding roost	-

SAPOTACEAE					
Manikara zapota	sapodilla	sawo	food	night feeding roost	-

Cybr: *Cynopterus brachyotis*; Cymi: *Cynopterus minutus*; Cysp: *Cynopterus* sp.; -: not available.
* The *Erythrina* sp. was planted to support the growth of *Piper nigsum*. A small colony of *Cynopterus* bats was recorded roosting under *P. nigsum with* supporting *of Erythrina* sp.

b. The first mammalian species list in the coffee plantations of Indonesia

This project was not only the first comprehensive study on wild mammalian fauna of coffee agroecosystem in the Bukit Barisan Selatan landscape but probably also the first one in Indonesia. Five Infrared camera traps were set up since mid March 2012. Three mammal species, including the Asian elephant (*Elaphas maximus*), boar (*Sus scrofa*), and short-nosed fruit bat (*Cynopterus* spp.), were recognised during the survey period. The proposed mist netting and additional harp trapping showed a greater species richness of bats than in the camera trapping. Twenty-one bat species, including nine plant-visiting bat species and 12 insectivorous bat species, were caught by mist nets and harp traps together. Additional 11 mammal species, including endangered mitred leaf monkey (*Presbytis melalophus*) and the Malaysian flying fox (*Pteropus vampyrus*), were also either reported by local famers during the interviews or recorded during survey area (table 2).

Table 2. Wild mammal species recorded by different methods in coffee plantations of Way Heni village, Sumatra. IUCN status includes species threatened category and population status.

	IUCN Status	Camera Trap	Mist Net	Harp Trap	Witness /tract	Interview
ARTIODACTYLA						
Suidae						
Sus scrofa	LC; unknown	V			V	V
CARNIVORA						
Viverridae						
Paradoxurus hermaphroditus	LC; stable					
Prionodon linsang	LC; decreasing					
Viverridae sp.	-				V	V
Felidae						
Prionailurus bengalensis	LC; stable				V	V
Ursidae						
Ursidae sp.	-					V
CHIROPTERA						
Pteropodidae						
Cynopterus brachyotis	LC ; unknown		V			
Cynopterus horsfieldii	LC ; unknown		V			
Cynopterus minutus	LC ; decreasing		V			
Cynopterus sphinx	LC ; increase		V			
Cynopterus spp.	-	V	V	V	V	V
Eonycteris spelaea	LC ; unknown		V			
Macroglossus sobrinus	LC ; stable		V	V		
Megaerops ecaudatus	LC ; unknown		V			
Pteropus vampyrus	NT; decreasing					V
Rousettus amplexicaudatus	LC ; unknown		V			

Rousettus leschenaultii	LC ; stable		V			
Hipposideroidae						
Hipposideros bicolor1	LC ; stable			V		
Hipposideros cervinus	LC ; unknown			V		
Hipposideros cineraceous	LC ; unknown			V		
Hipposideros diadema	LC ; unknown		V			
Hipposideros larvatus	LC ; unknown		V	V		
Rhinolophidae						
Rhinolophus acuminatus	LC ; unknown			V		
Rhinolophus affinis	LC ; unknown		V	V		
Rhinolophus lepidus2	LC ; unknown			V		
Rhinolophus luctus	LC ; unknown		V			
Vespertilionidae						
Myotis muricola	LC ; unknown		V	V		
Phoniscus atrox	NT; decreasing			V		
Pipistrellus stenopterus	LC ; unknown			V		
PRIMATES						
Cercopithecidae						
Presbytis melalophus	EN; decreasing				V	V
PROBOSCIDEA						
Elaphantidae						
Elaphas maximus	CR; decreasing	V			V	V
RODENTIA						
Muridae						
Rattus norvegicus	-				V	
Sciuridae						
Callosciuris notatus	LC; increase				V	
Lariscus insignis	LC; decreasing				V	
Hylopetes sp.	-		V			
Sciuridae sp.	-					V

IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. CR: critical endangered; EN: endangered; VU: vulnerable, LC: leas concern; NT: near threatened; LC: least concern; DD: data deficient; - : not available.

[1] All *Hipposideros bicolor* - like bats (*H. bicolor, H. atrox)* were assigned to *H. bicolor* based upon previous records of the study area.

[2] All *Rhinolophus lepidus* - like bats (*R. lepidus, R. pusillus)* were assigned to *R. lepidus* based upon previous records of the study area.

c. <u>Understand farmers' awareness and perception to wildlife and wildlife bean</u>

Sixteen male coffee farmers were interviewed in 2011 October. Among the given vertebrate groups (bats, non-flying small mammals, big mammals, birds, Lizards, frogs, snakes), most interviewees have seen all kinds of mammals (bats: 94%, non-flying small mammals: 94%, big mammals: 100%, and birds: 88%) in their plantations. The interviewees' perceptions of the frequency of animal groups were: moderate to lizards (63%), low to frogs (31%), and absent to snakes (0%), despite the prevalence of those animal groups in the study area (Chun-Chia Huang personal observation).

For the next step, I focused on farmers' awareness of the ecology of bats, which were commonly perceived by the interviewees. Bats are known associated with tropical agroecosystems by the ecological functions (pollination, pest control, seed dispersal) provided and the potential loss of income by their consumption of economic crops. In general, most farmers knew what bats were (93%), but disliked the presence of bats on their properties (dislike: 81%, like: 13%, neutral: 6%). In general, the interviewees knew the roost types bat used in their properties (leaves: 81%, house: 56%, cavity: 25%) but did not know bats also can use caves as roosts (13%). The interviewees knew bats consume fruits (100%) and insects (50%) but not that they also consume nectar/pollen (6%) and leaves (0%). Regarding the interactions between farmers and bats, 69% (n=11) of the interviewees knew that bats consumed crops in their plantations, including coffee berries, and seven of the 11 farmers thought bats' consumption affected the yield of their plantations. Ten of the 11 farmers correctly recognised that fruit bats were the only bat consumer of their crop, and one famer indicated that both fruit bats and insectivorous bats as the consumers. One farmer was aware that bats may disperse diseases to humans and one farmer was annoyed by the droppings from bats in his house. None of the farmers thought bats would attack human and all of them knew there were no vampire bats in the study site. Only 38% of the interviewees knew that bats can remove pests from their plantations and most of them did not know the other ecological functions that bats can provide (pollination: 19%, seed dispersal: 0%).

Concerning wildlife-discarded beans, 75% (n=12) of the interviewees knew and found civet beans in their plantations. Only three of the 12 farmers have collected civet beans but none of them sold the beans. Half and 38% of all interviewees knew and found bat beans, respectively, but none of them collected the beans. Fifty percent of the interviewers tried civet beans and regarded the civet coffee tasted better than regular coffee. Around 19 % of the farmers tried bat beans but none compared it with civet coffee and regular coffee.

In conclusion, farmers were more aware of vertebrate groups with whom they interacted more during their life. In the study area, elephants and non-flying small mammals (mostly tree squirrels in this case) were known as major pests to fruit trees in coffee plantations. Birds were captured for use as pets, bushmeat, and cash (to pet markets) (anonymous personal communication). Similar patterns were found in awareness interviews conducted about bats. For example, farmers were aware of fruit bats and foliage-/ house-/cavity-roosting bats more than insectivorous bats and cave-roosting bats. The unfamiliarity about nectar-feeding bat and bat ecological services can be explained by a lack of education (based on the participant's response during workshop).

4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).

In this project, I cooperated with lecturers and students from University of Lampung (UNILA), and staff from Wildlife Conservation Society-Indonesian Program (WCS-IP) working as Bukit Barisan Selatan Bat Research Team (BBSBRT)**.** BBSBRT is a very young academic group that registered as a social group under the Southeast Asia Conservation and Research Unit (SEABCRU, http://www.seabcru.org/). The goal of the team is to improve the research and conservation of bats in BBS landscape, and to link to other conservation groups in Southeast Asia. BBSBRT is currently. Two students (Miss Eka Sulpin and Mr Rahmat) from UNILA have joined the field work and finished their internship and thesis projects on the roost us and food use of phytophagous bats under the project. A workshop (not proposed in the proposal) was conducted in July 2012 to introduce bats to the local community. The aims of the workshop were to improve coffee famers' understanding of bats and the ecological services of bats and to understand whether and how the outreach can

increase the acceptation of local community to bats and other wildlife that associated with them. Around 60 people from Way Heni area (Sumber Rejor and Pemerihan villages) attended the workshop, and most of them were coffee farmers. Lectures, games, and demonstration of bats were given for the workshop.

5. Are there any plans to continue this work?

Currently, I am seeking methods to optimise the quality of the bat coffee by controlling the production process of the coffee.

The central idea of the project is encouraging farmers to manage their plantations in wildlife friendly ways, while maintaining the benefits associated at the same time. To achieve this goal, one of the key elements is to maximise the profit from the bat coffee beans. Therefore, to control and to optimise the quality of the coffee are necessary and fundamental. The process from cherry to coffee is complicated and usually involves six steps: processing cherry (dry, wet, semi-wet, pulp natural methods), drying beans (sun bath if cherries processed by non-dry methods), milling the beans (hulling, polishing, grading), roasting bean, grinding beans, and brewing coffee. Since the bats consumed most skin and pulp of the cherries, the bat-discarded beans (some with part of the skin and pulp) cannot be processed by the traditional dry method. It is because that without full covered by skin and pulp, the drying process would damage the quality of beans easily. Therefore, after picking up bat beans, there are at least two steps needed to be done by the farmers before selling to coffee traders: processing cherry (wet, semi-wet, or pulp natural methods) and drying the beans. However, based on the interviews, farmers in the study area used only dry method to process coffee cherry. In other words, farmers did not have enough knowledge and skills to process cherry in different ways and drying the bean after.

I plan to visit experienced coffee producers and merchants in 2013 summer for consulting the process protocol and seeking further cooperation to train farmers how to process the bat beans in better ways.

6. How do you plan to share the results of your work with others?

- The recipient presented this project during the 2nd International Southeast Asia Bat Conference at Bogor, Indonesia, in 2011 June.
- Pictures and simple description about the workshop were upload to SEABCRU website (http://www.seabcru.org/index.php/outreach/112-changing-the-face-of-coffee-farmers-2012-bat-workshop-in-southwestern-sumatra) and the recipient's Facebook (https://www.facebook .com/media/set/?set=a.491456700869253.129879.100000147827938&type=1). The workshop materials are available for download on the SEABCRU website (http://www.seabcru.org/ index.php/component /content/article?id=114).
- The recipient introduced bat-discarded coffee to the participants in the 2nd Southeast Asia Bat Conservation and Research Unit Workshop at Hat Yai in July 2012. A trial of coffee test on the bat coffee, and civet coffee was lunch during the workshop. An additional interview on 50 bat biologists was conducted after the trial. The purpose of the introduction and interview was to share the concept and the conservation values of wildlife coffee to scientific audience from different countries.

- A short article and photos of the wildlife bean will be shared on SEABCRU website (http://www.seabcru.org/) and SEABCRU on Facebook (https://www.facebook.com/groups/ 125833910791607/) after this report.
- I will submit two to three manuscripts based on the findings in the project and the students' projects to international peer-reviewed journals.
- I will present the findings of this project in Texas Tech Annual Biological Science Symposium at Lubbock, USA, and International Bat Research Congress at San José, Costa Rica, in 2013.

7. Timescale: Over what period was the RSG used? How does this compare to the anticipated or actual length of the project?

The RSG was used from October 2011 through July 2012, which finished 1 month earlier than in the proposal because of the restriction by the end of permit in July 2012. The interview and pre-tests of enclosure setting-up were done by October 2011. The pre-test of camera trap setting-up and monitoring site selection were not conducted until the recipient received the cameras from USA in February 2012. In order to match the needs of the purposes of the project, all proposed field works were not carried out until the beginning of coffee fruiting season in March 2012. During the gap between November 2011 and January 2012, the recipient was working on other projects of his thesis in Indonesia with other funding resources.

Since the field work covered a shorter period than in the proposal and received other funding prior to RSG, part of the RSG budget was not spent. Based upon the results of the interviews, the recipient and his local collaborators of BBSBRT decided to use the money holding a workshop for local coffee farmers at the end of the project in July 2012. The purpose of the workshop was to help the farmers to understand the biodiversity and the benefits of the ecological services associated in their plantation. Additionally, the team hoped the outreach work can help us to hear more sounds from the local community and increase the interaction between the team and the community, which fundamental to *in situ* conservation work in the future.

8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Research Permit	323	175	148	Indonesia government changed the fee for students
Field technician: two local Staff from Wildlife Conservation Society-Indonesia Program.	1,595	1,790	-195	Difference between exchange rates from proposal submission to fund deposit. (between USD & IDR)
Fee to coffee farmers	0	241	-241	As compensation for experiment setting-up in their plantations
Infrared camera trap: 4 units (Reconyx HC600 Ultimate Package)+desiccants: 10 units	1,806	1,719	87	Difference between exchange rates from proposal submission to fund deposit. (between USD & GPD)

Shipping for camera traps	0	305	-305	The camera traps ordered and delivered to USA after the recipient went to field in Indonesia
Canopy net: 2 units (for fruit bat mist netting)	176	0	176	Funded by Texas Tech University and purchased before receiving RSG
Fishing rod: 6 units (for mist net set-up)	65	0	65	Funded by Bat Conservation International and purchased before receiving RSG
Torch: 10 units (for bat mist netting)	226	0	226	Funded by Bat Conservation International and purchased before receiving RSG
Batteries: 50 sets	0	172	-172	Purchase for torches.
Plastic mesh (for enclosure set-up)	387	168	219	Using metal mesh instead because plastic mesh was not available
PVC pipe (for enclosure set-up)	78	0	78	No need due to the change of enclosure design.
Lodging/meal at village	1,344	963	381	The field work was shorter than the duration proposed due to the late beginning of the fruiting season of coffee in the study area and limit of permit
Workshop material	0	275	-275	posters, photocopy of interview questionnaire, handout, leaflet
Workshop facilities	0	192	-192	renting speaker, table, chairs, generator, bulb, gasoline, and food, drink
Total	6,000	6,000	0	Exchange rate at deposit of fund (July-28-2011): 1.62 USD per GPD Exchange rate at proposal: 1.55 USD per GPD All amounts are rounded to integer.

9. Looking ahead, what do you feel are the important next steps?

Based on the currently information, the bat-discarded coffee bean is not restricted to the study area of Sumatra, but more general geographically across tropics. Several cases of bat-discarded coffee bean were reported from different tropical regions recently. Two additional sites of the bat coffee were known in the Old World tropics, including India (Sanjay Molur, via Paul Racey personal communication) and the Philippines (Godfrey Jakosalem, personal communication). The India's bat coffee beans were collected and sold in annual auction regularly. Moreover, a Neotropical version bat coffee was found in Costa Rica and just released on the market since October 2012 (http://www.seaislandcoffee.com/coffee/bat-coffee-cost-rica.html). Those successes of bat coffee

support our expectation of the economic value of this wildlife-associated product, which is the key in helping farmers to recognise the additive value of wildlife associated with them. Nevertheless, there are at least another three elements needed to make the project successful: feeding site selection by bats, linking the wildlife coffee with biodiversity conservation, and then recognition of this conservation value of the coffee by consumers. Based on the contexts, BBSBRT is interested in the following questions:

- Night feeding site selection of bats
  During the survey period, more than 110 plants were used by bats as night feeding roosts. Less than 10% of the roosts were coffee bushes despite its dominance in the study area. The data indicate that bats tended to select non-coffee plant species as night feeding sites. This finding leads us to ask the question: whether farmers can gain higher yields of bat coffee in plantations if they plant more crop species that are favoured by bats? For the next step, BBSBRT is planning to study whether bats select certain plants for feeding in the night or use the plants randomly. If they select feeding sites, which characteristics (species, shape, spatial distribution, landscape) do bats use for selection? The expected outcomes will not only help us understand more about the roosting/feeding ecology of Paleotropical phytophagous bats but will also help local farmers manage their plantations to increase the profit stimulated by the presence of bats.

- The correlation among cultivation, biodiversity and production of bat coffee
  The cultivation of coffee in the study area can be roughly classified into two types. One was coffee plantation with relative higher canopy shade and higher crop diversity. In contrast, another type was coffee plantation with less shade and less crop diversity. Based on the mist netting in this project, the capture rate of phytophagous bats was higher in the higher-shaded plantations than in the lower-shaded plantation. It would be interesting to know how wildlife interacts with different cultivation types, and whether the interaction can affect the biodiversity supported and the yield of bat coffee. For examples, do the higher-shaded plantations support higher diversity of wildlife by providing more food resources and shelter/nest sites for animals?

- To find an adequate wildlife-friendly eco-label for the bat coffee
  The design and use of eco-labels is to provide a certification that consumers can participate in environment and biodiversity conservation via purchasing the certified products. BBSBRT is interested in looking for a proper eco-label from existing certifications for the bat coffee. To use an eco-label will allow more consumers to recognize the conservation value of the bat coffee (if demonstrated) in addition to its unique producing process (manipulated by wild bats) and potential better quality. This will then help the local farmers to manage their plantations more wildlife-friendly and the production of bat coffee substantially.

10. Did you use the RSGF logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?

The RSGF logo and title were use in a presentation at the 2nd Southeast Asia Bat conference in Bogor, Indonesia and the workshop materials for coffee farmers in Sumatra (see supplements), and final reports to Indonesian State Ministry of Research and Technology (Indonesia), Bukit Barisan Selatan National Park (Indonesia), University of Lampung (Indonesia). The RSGF logo or title will be included in all presentations and publication based upon this project.

11. Any other comments?

I gratefully thank the following Indonesian offices for permissions of this project: Indonesian State Ministry of Research and Technology (RISTEK), the Ministry of Forestry Republic Indonesia (PHKA), the Biodiversity Conservation office (KKH), the Research Centre for Biology of Indonesia Institute of Sciences (LIPI), and Museum Zoologicum Bogoriense (MZB) of LIPI. I also thank Mrs. Elly L. R. Jazdzyk (University of Lampung, UNILA), Mr. Meyner Nusalawo (Wildlife Conservation Society-Indonesia program, WCS-IP), all the people who assisting field work and the workshop; Dr. Ibnu Maryanto (LIPI-MZB), Mr. Sigit Wiantoro (LIPI-MZB), Dr. Gabor Csroba (Hungarian Natural History Museum), and Mr. Faisal Ali Anwarali Khan (Texas Tech University, TTU) for species identification; Local farmers of Way Heni villages for accommodations and permission to trap on their property; Dr. Mark E. Harrison (University of Cambridge), Mr. Taufiq P. Nugraha (LIPI), Mr. Sephy Noerfahmy for the comments on interviewer questionnaire and workshop materials. Dr. Gono Semaidi (LIPI) for commends on camera setting-up. I also thank Dr. Paul Racey and Mr. Godfrey Jakosalem sharing their information of bat coffee. The field work and equipment were partially founded by Bat Conservation International, American Society of Mammalogists, IDEA WILD, and Texas Tech University in additional to RSGF.