

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. 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. 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

Your name	Nantida Sutummawong
Project title	Assessing the climate change vulnerability of bird biodiversity in the rainforests of Thailand
RSG reference	14442-1
Reporting period	January 29 th 2014 – January 30 th 2015
Amount of grant	£6000
Your email address	nant63@hotmail.com ; nantida.sutummawong@my.jcu.edu.au
Date of this report	September 3 rd 2015

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
Establish a suite of long-term monitoring sites across elevational gradients in Thailand, and commence surveying bird biodiversity at these sites.			Yes	Over 2 years (2013 and 2014) we set up 99 long-term permanent monitoring sites across the entire available elevational and latitudinal gradients of evergreen forest ecosystems in Thailand. This included five protected areas; Doi Inthanon National Park, Huai Kha Khaeng Wildlife Sanctuary, Khao Yai National Park, Kaeng Krachan National Park, and Hala – Bala Wildlife Sanctuary. During this period we conducted 825 standardised bird surveys across 99 sites (Fig. 5). Each survey point was sampled on four separate field trips to include two wet season and two dry seasons. On each trip, each point was sampled twice, once in the morning and once in the afternoon, resulting in a total of eight surveys for each point. These standardised data will form the basis for thesis chapters. These surveys recorded 22,764 individual birds and a total of 435 species. The Rufford Small Grant supported 422 surveys of this project in 2014.
Predict how Thailand's rainforest bird assemblages will respond to anthropogenic climate change		Yes		We successfully produced the most accurate spatial distribution maps currently available for 313 Thailand forest bird species. We conducted preliminary assessments of the response of lowland and montane birds to an increasing temperature. These results were presented at the ATBC 2015, Asia-Pacific chapter, Cambodia. However, the future predictions are based on complex spatial modelling that is ongoing. This aspect is currently in progress and we envision this to be completed by the end of 2015.
Increase Thailand's knowledge on the potential biodiversity impacts of climate change and aid in stronger management decisions in the future		Yes		We have completed analyses of the current spatial pattern of Thailand's forest bird diversity. These analyses show that the main forest complexes to host highest forest bird biodiversity are the: <ul style="list-style-type: none"> i) Northern forest complex that connects to ii) the western forest complex iii) the Khao Yai – Dongpayayen forest

Objective	Not achieved	Partially achieved	Fully achieved	Comments
				<p>complex and iv) the Hala-Bala forest complex, the biggest lowland tropical forest in the southern part of Thailand</p> <p>We increased knowledge base on the distribution of species and helped build capacity for the local staff and managers of each protected area to manage potential impacts of key threatening processes such as climate change.</p>

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

2.1 Strange weather in 2014

The quality of field data on bird distribution and abundance generally depend on weather. Consequently, surveys taken when there is rain, fog, and wind may bring about biases. The strange weather in 2014 became a key challenge and caused the fieldwork to be delayed. It rained from February 2014 and sparsely continued until the end of the year, the weather became abruptly cold, windy, and foggy. Particularly on December 2014 heavy rain fell all month causing floods in the Southern part of Thailand. All these experiences caused unexpected changes in the fieldwork plan.

To deal with the problems, I had to stay at each site longer than originally anticipated to wait for clear weather and start the survey in appropriate conditions, also in some place such as Hala-Bala Wildlife Sanctuary, I returned to do fieldwork twice in the last field trip. If there was rain, wind, or fog during the survey, I stopped the survey and started it again when the weather was clearer.

2.2 Personal health problems

In November 2014 for the last field trip, I had sprained my ankle after completing surveys at the first field site (Kaeng Krachan National Park). Thus, I had to stop working for 2 weeks and this resulted in completing fieldwork later than I had planned.

2.3 Difficulty to hire vehicle to access into the wilderness areas.

Two of five sites as Huai Khla Khaeng Wildlife Sanctuary and Kaeng Krachan National Park are the hardest remote sites to access. I had to use a 4W Drive vehicle to access these areas. I encountered a regular issue where I had to fix the vehicle after every trip upon my return to the city. It proved challenging to hire a vehicle from the company. I had to rent a vehicle with higher rental car prices than normal and I had the added responsibility to fix vehicle when it was needed.

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

3.1 A series of high-resolution maps of where species are most vulnerable to climate change.

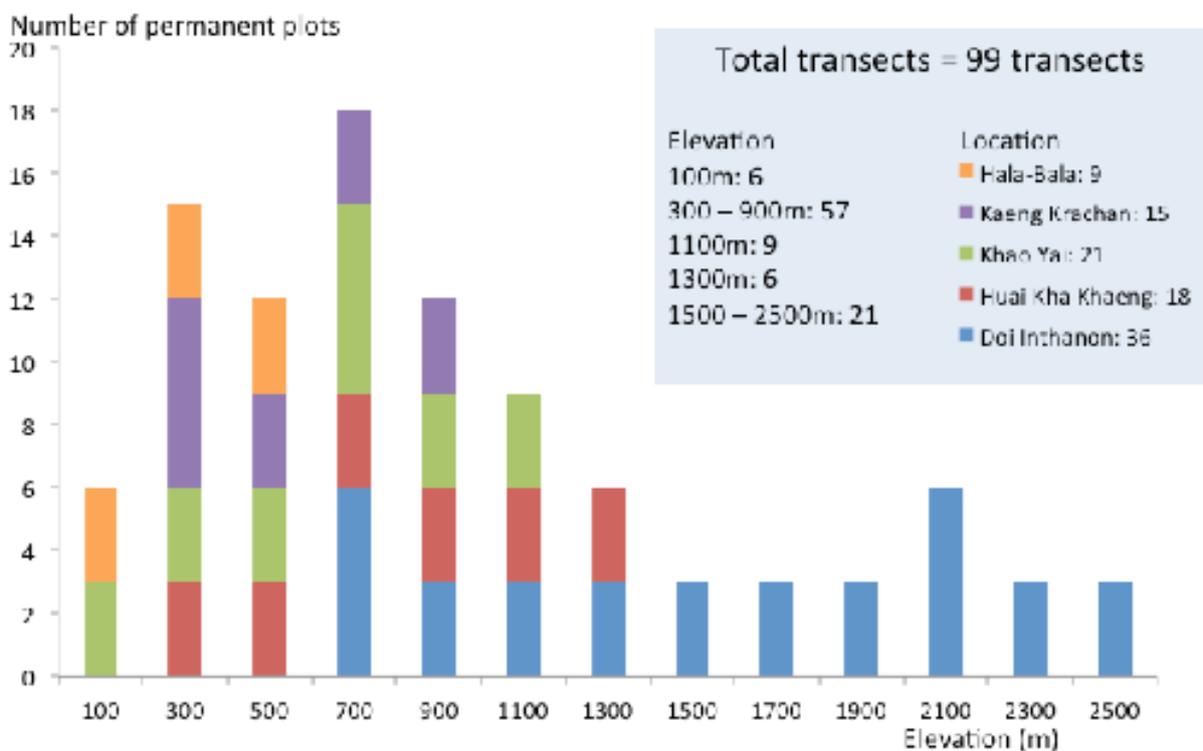
These maps are essential for efficient national and regional conservation management in that they will allow for limited conservation resources to be employed most effectively on species and areas that are most in need of active management. However, at this time I am in the process of analyses

with 435 species of Thailand’s forest birds that I have found in my fieldwork. These results will be illustrated in my thesis.

3.2 Long-term monitoring sites in ways that are suitable for detecting and predicting climate change impacts across Latitudinal and Elevational of Thailand.

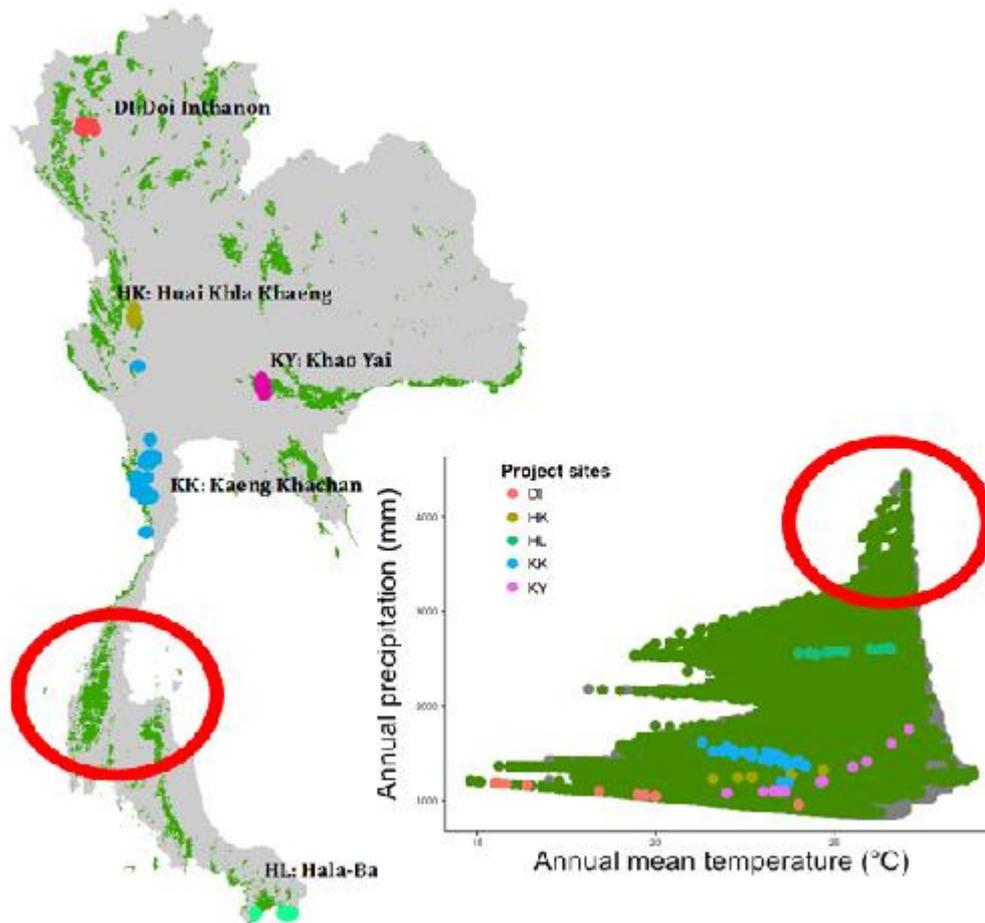
We set up 99 standardized long-term permanent sites cover 100 – 2500 meter above sea level across the entire available latitudinal gradients of evergreen forest ecosystems in Thailand (Figure of Number of monitoring sites along elevational gradients).

Figure of Number of monitoring sites along elevational gradients: The total of monitoring sites that I have set up is 99 transects cover 100 – 2500 m across 5 protected areas.



These standardised sites cover most of the elevational and temperature range across both geographic and environmental space of evergreen forest in Thailand, as well as the entire latitudinal range of evergreen forest in Thailand, but they do not cover every available range of rainfall patterns for high rainfall, which can reach over 3000 mm per year. Despite this, my sampling covers most of the available temperature range and therefore provides a good basis for understanding the implications of future changes in temperature for Thailand’s birds.

Figure of long-term permanent sites cover environmental space: Thailand's environmental space of two main important climatic variables to species occurrence that are mean temperature (x-axis) and annual precipitation (y-axis) and standardised sites in the evergreen forest of Thailand: Thailand environmental space (grey), environment space of evergreen forest (dark green), and environmental space of long-term permanent sites: Doi Inthanon (pink), Huai Khla Khaeng (olive), Hala-Bala (turquoise), Kaeng Krachan (blue), and Khoa Yai (purple), the red circles are the areas where my sites do not cover the rainfall space.



3.3 Build local capacity in biodiversity monitoring in ways that are suitable for detecting and predicting climate change impacts

The ultimate aim of building local capacity is that the monitoring can continue well after my project ends, which will be crucial for detecting and adapting to long-term trends in Thailand's bird biodiversity. I trained over 80 local participants in the project, whether as project collaborators, field crew-members, volunteer students, government agencies, bird club members, university, or key informants in social science research. These participants form a network to share the techniques and knowledge needed for monitoring bird biodiversity and adaptation to climate change in Thailand.

The local participants have developed broader knowledge and understanding on the techniques used for monitoring bird biodiversity and they have increased their awareness about natural resource management, conservation and recently, the effect of climate change in their communities. A key example of building local capacity in biodiversity monitoring to deal with climate change is

illustrated through local rangers. First ranger staff from all five protected areas were trained in climate change and its effect on biodiversity; next, they were trained in techniques on how to collect bird and environmental data in ways suitable for detecting climate change; how to classify bird; how to download humidity and temperature data from loggers to computers; how to measure vegetation cover. Overall, rangers gained increased awareness of the importance of forests areas in their communities.

In addition to this, participants from government agencies, bird clubs, and universities are working towards changing how they communicate bird conservation. They now include discussion on the importance of studying climate change impacts on birds in Thailand and networking with one another. I have elaborated on bird data with the National Science Museum, the Department of National Parks, Wildlife and Plants Conservation, King Mongkut Institute Technology, Kasetsart University, Lanna Bird club, and Birds Conservation Society of Thailand (BCST), all institutions that are of high importance for future research on Thailand biodiversity.

Lastly, the data and interpretive tools, such as long-term monitoring sites, species data and climatic information that resulted from my project will be of direct benefit to the local managers of national parks and other stakeholders, including community groups and conservation NGOs. Specifically, the information and analyses that I will provide on the status, trends and threats to species is aimed to inform and catalyse local actions for biodiversity conservation.

Thus, the expected outputs from this project will have a direct and practical relevance to regional and local biodiversity conservation in Thailand. There is a great need for this type of work in the country given that climate change represents one of the greatest challenges to its sustainable future.

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

During our informal workshop on “How to monitor the impact of climate change on Thailand forest birds”, we gave informal lectures to local staff of each protected areas as Doi Inthanon National Park, Huai Khla Khaeng Wildlife Sanctuary, Khoa Yai National Park, and Hala – Bala Wildlife research station. The lectures topics covered 1) What is climate change, 2) Effects of climate change to biodiversity, 3) What is happening/threatening to Thailand’s biodiversity, 4) What could happen in Thailand’s future, 5) Why the understanding on the effect of climate change on forest birds is important, and 6) How to monitor the impact of climate change on forest birds. Through this workshop we engaged with local peoples dialogues of monitoring the impact of climate change on forest birds, we provided them technical sampling skill such as bird classification by visual and call; we showed them how to use GPS; how to download temperature loggers; how to measure humidity, temperature and measure vegetation cover. We encouraged participants to become part of our conservation network.

Further to this workshop, we had informal meetings and discussion on information of the situation of climate change on Thailand biodiversity with biologists, conservationists, and students at the Thailand Wildlife Seminar 2014 at Kasetsart University, Bangkok. We also encouraged them to become parts of our conservation networks.

Figure of local community involvement: our dedicated networks of conservationists include patrol rangers, forestry students, NGO volunteers, and biologist and volunteer from National Science Museum.



5. Are there any plans to continue this work?

In Thailand and most of Southeast Asia, long-term monitoring data for evaluating the impact of climate change remains mostly insufficient. The use of short-term and crude guess data to estimate the impact of climate change on organism and biodiversity have hindered conservation planning. There is a need for stronger conservation management decisions in the region in the future. We strongly believe that integrative area management, flagships species, and ecological data will play an important role in supporting conservation management decisions adapt to climate change.

To deal with insufficient data for assess the impact of climate change, we will continue monitor bird abundance with standardised methods in all permanent sites that we have set up. I hope to be a lecturer at Thaksin University, Thailand, after I graduate. I will use this opportunity to continue conservation initiatives and activities at these permanent sites as an area-base for my prospective students to gain hands-on experiences in community-based conservation initiatives along with field conservation research and conservation education, which can also be applied to other species.

Flagship species are important to conservation management as focusing on some species can have the umbrella affect of conserving others. We will continue our work to assess species risk to climate change and work use birds as flagship species. The work will result in a list of bird statuses in the face of climate change and used for conservation management in evergreen forests.

In regards to developing conservation strategies to future climate change, the terms used for forest complex connectivity is a key strategy for effective management. Our findings show that there are four important forest complexes that are high in bird diversity: 1) north – western forest complex, 2) Western forest complex (WEFCOM), 3) Khao Yai – Dong Prayayen forest complex, and 4) Lowland forest complex in the southern part of Thailand (Figure of spatial pattern of bird diversity in Thailand). As such, managers could focus on managing forest complexes as they are connected to other individual protected areas.

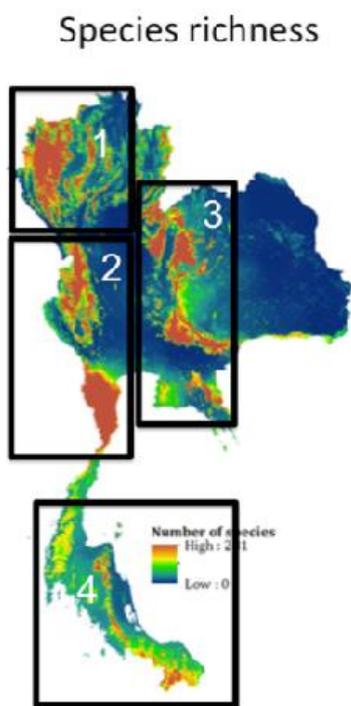


Figure of spatial pattern of bird diversity in Thailand: Spatial pattern of species richness of Thailand's evergreen forest avifauna (based on binary species presence/absence in each pixel above the identified threshold value from each MaxEnt SDM).

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

This work will be published as my PhD thesis at the James Cook University, as well as in the peer-reviewed journals. It has been presented in the 51st Annual meeting of the Association for Tropical Biology and Conservation (ATBC), 20 – 24 July 2014, Cairns, Australia. I also used the RSGF towards attending and presenting at the Annual meeting of the Association for Tropical Biology and Conservation (ATBC), Asia-Pacific Chapter, 30 March – 2 April 2015, Phnom Penh, Cambodia.

In addition to my thesis, we will provide a report and the assessment framework on vulnerability of climate change on Thailand forest birds to government agencies (such as the Department of National Parks, Wildlife and Plant Conservation, the Royal Forest Department, National Science Museum), NGO (WCS/WWF), and local university to increase the knowledge on climate change impacts to Thailand's biodiversity.

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

The funding support from RSG is a part of a larger budget needed to complete this dissertation. The funds were used for field activities from 29th January 2014 to 30th January 2015.

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
1. Research stipend and compensation	2500	2650	-150	Due to extended fieldwork, funding from the workshops to train local staff was added to make efforts on obtaining bird survey
2. Field equipment (data logger, camp gears, Hygrometer, etc.)	200	200	0	N/A
3. Field supplies (included gas and food during the field work, office supplies, and truck maintenance)	3000	3250	0	Same reasons as Research stipend and compensation and covered by other funding
4. The workshops to train local staff	300	100	200	The cost for workshops to train local staff was reduced by merge workshop cost in the same time of fieldwork, then added this cost to stipend for field assistants and field supplies caused of extended fieldwork
5. Airfare to Thailand from Australia (2 times a year)	0	0	0	N/A
TOTAL	6000	6000	0	

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

There is a lack of knowledge regarding synergistic impacts of climate change and land-use change on the world biodiversity, in particular Thailand and Southeast Asia where dramatic forest destruction occurs. We already know that land-use change and climate change are two important stressor effecting ecology and biodiversity. We do not know what compounding effects of climate change will have on land-use change. To understand which species and what areas are at risk to these changes, predicting how these two important stressors interact is urgently needed. Moreover, managers, protected area staff and NGO groups need to improve their knowledge on the impacts of climate change to biodiversity and how to assess the vulnerability of species to changing on climate in their area.

We will produce an assessment framework on vulnerability to climate change on birds of Thailand as a baseline for understanding species' response to climate change. We will also promote and disseminate information such as species distribution maps and species conservation statuses that resulted from the study. These can contribute to the national climate change wildlife action plan and the National Master Plan on Climate Change to improve and achieve effective conservation management and ensure the persistence of the threatened species.

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 has been used on the 51st Annual meeting of the Association for Tropical Biology and Conservation (ATBC), 20 – 24 July 2014, Cairns, Australia. I also has been used the RSGF on the Annual meeting of the Association for Tropical Biology and Conservation (ATBC), Asia-Pacific Chapter, 30 March – 2 April 2015, Phnom Penh, Cambodia. Furthermore, I will use it in PowerPoint and poster presentations at the university and at conferences, and in my final reports to the Department of National Parks, Plants, and Wildlife Conservation of Thailand.

11. Any other comments?

I am honored to be a beneficiary of Rufford Small Grant. Your plentiful support helps me and my teams fulfill our goal of to determine the potential impacts of climate change on Thailand's forest bird biodiversity and aid in stronger conservation management decisions in the region in the future. This grant is critical for me to gain multidisciplinary research experiences as well as contribute back to the graduate community and general public via outreach engagement and academic presentations. My long-term goal is to increase our concrete information on the potential impacts of climate change and other human stressors to Thailand biodiversity. In the face of rapid environmental changes, a better understanding of these impacts will lead to effective management of endangered species and I am truly grateful for the support that my research has received.