

CEPF Final Project Completion Report

Instructions to grantees: please complete all fields, and respond to all questions, below.

Organization Legal Name	Charles Darwin University
Project Title	Ecology of the Eastern Sarus Crane and Drivers of Population Trends
CEPF GEM No.	77636-000
Date of Report	17 May 2016
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CEPF Region: Indo-Burma

Strategic Direction: 1. Safeguard priority globally threatened species by mitigating major threats

Grant Amount: US\$19,780

Project Dates: 1 April 2014 – 3 May 2016

1. Implementation Partners for this Project (*list each partner and explain how they were involved in the project*)

The Wildlife Conservation Society (WCS) – assisted me with obtaining visas, drivers license renewals and other administrative work. Facilitated access to research sites such as Ang Trapeang Thmor (ATT), Stoung grasslands, Kulen Promtep Wildlife Sanctuary and Preah Vihear Protected Forest (permission, use of motorbikes, accommodation). Helped find people from local communities to employ as field assistants (especially ATT and Stoung) and WCS staff participated in the 2015 nest site selection research I conducted in breeding areas in 2014 & 2015. WCS staff include members of the Forestry Administration, the Ministry of Environment and local communities. WCS have also shared supplementary data for use in my research.

The Wildfowl & Wetlands Trust (WWT) – facilitated access to research sites (mainly permission to work in the wetlands) and sharing of data related to my research project. WWT staff include members of the Forestry Administration and local government bodies.

Conservation Impacts

2. Describe how your project has contributed to the implementation of the CEPF ecosystem profile

Although much of the data collected still needs to be analyzed, the field work carried out under this research project is expected to put conservationists in a better position to meet the

ecological requirements of Sarus Cranes and implement an overall strategy to conserve the species in Cambodia and Vietnam. Partly due to my research, conservationists working on Sarus Cranes intend to have a workshop in July 2016 to create a Sarus Crane action plan for Cambodia and Vietnam. Although this is earlier than I personally had intended and I will only be able to use draft results, having such a meeting after completion of this research project was always an intended goal of my project: to have my research help guide a conservation plan for the species. In this way my research will better enable the various actors to work on safeguarding this regional population of Sarus Crane and work towards mitigating major threats identified through my research and in the July workshop.

3. Summarize the overall results/impact of your project

Although the project focused on data collection, with much of the data still to be analyzed, published and integrated in to conservation planning for the Sarus Crane in Cambodia and Vietnam, interim results suggest that it is feasible to increase the Sarus Crane population if the following can be achieved:

1. Availability of the following habitats can be guaranteed:
 - a. Floodplain grasslands (in both the Tonle Sap and Mekong Delta regions)
 - b. Floodplain wet season ricefields left fallow in the dry season (in both the Tonle Sap and Mekong Delta regions)
 - c. Eleocharis wetlands (in both the Tonle Sap and Mekong Delta regions)
 - d. Grasslands in deciduous forests (in Northern and Eastern plains)
2. Each of the above key habitats are especially targeted at a particular time of year and management of sites within such habitats should be improved by ensuring the following:
 - a. Floodplain grasslands should have a gradual to rapid drawdown and should provide forage from November to February. Having pockets within the larger area where water is retained longer (lakes, ponds), will allow the cranes to use the site longer.
 - b. Floodplain wet-season ricefields targeted by cranes (Ang Trapeang Thmor and parts of the Tonle Sap floodplain) are kept fallow in the dry season, e.g. the traditional system of a single crop of wet season rice is maintained. This provides additional food, especially as floodplains start to become very dry in January and February.
 - c. Cranes may also shift to dry season ricefields in floodplains after harvest. This is in areas where water is too deep for wet season rice and as long as the area is cultivated once per year this provides an additional rice grain foraging window for cranes around February/March.
 - d. Eleocharis wetlands. Key here is to provide a late dry season foraging area for cranes. A gradual drawdown is required, so that Eleocharis plants will grow and build up tubers, while retaining enough water to allow foraging in moist soils/shallow water conditions in much of the wetland from March to May.
 - e. From June to October adult pairs will nest and raise young in Cambodia's deciduous forests. Grasslands are selected. In certain areas grasslands are targeted for conversion to ricefields and this requires urgent control. Another important issue is to reduce number of people accessing breeding areas and particularly to change attitudes so that people will leave nests undisturbed.

Planned Goal (as stated in the approved proposal)

This study aims to provide new and much needed information on crane ecology to understand bottlenecks that may limit population growth.

4. Actual progress toward Goal at completion

As the project focused on the collection of data, the part for which CEPF funding was essential, and the work was conducted continuously throughout the year, the initial stated plan to have some of the data analyzed and published was too ambitious. Instead, the data will be analyzed from the end of project until publication and/or final submission of thesis. Although this means that an important part of the research is to continue beyond the project period, the focus on data collection and over a slightly extended period of time will ultimately make the final results stronger.

Some initial conclusions are presented above and interim results given below. In July 2016 there will be a workshop to produce a Sarus Crane action plan and interim results from this project (with some further analysis between now and July) will feed in to the action plan.

Planned Objectives (as stated in the approved proposal)

1. Study potential limitation in food supply at key non-breeding sites
2. Study potential limitations to breeding
3. Study human impact at all key sites

5. Actual progress toward Objectives at completion

As part of the studies on food selection and habitat use, we collected information on diet, time spent foraging, monitored number of cranes at sites, mapped foraging areas and assessed the availability and accessibility of food in the dry season. These studies show that cranes tend to select different habitats and food items depending on the stage of the dry season and food availability. Early in the dry season cranes will concentrate on floodplains, foraging for a variety of food items, but especially crabs, snails and certain plants. It was also seen that family groups tend to focus on floodplains longer than those without offspring. In the middle and later stages of the dry season they will concentrate on wetlands dominated by plants of the genus *Eleocharis*. They especially feed on plant tubers as long as these are accessible to them. Excessively dry conditions hamper the ability of cranes to extract these from the ground and they will switch to other food sources, especially rice. Waste rice grain remaining in fields after harvest is often in such abundance that the period in which such grains become available determines the arrival of cranes, rather than wetland condition. Ricefields cranes focus on are mainly in floodplains. Here the cultivation system is more extensive, less controlled and waste grain (lost yield) may be higher. There is also more chance of finding other supplementary food items.

The study on breeding ecology of cranes focused on understanding nest site selection parameters. As for other topics, much of the analysis still needs to be done, however it quickly

became clear that cranes were not selecting ponds to nest in, but instead nested in any part of a grassy clearing within dry deciduous forests. Although not tested, a hypothesis formed from this unexpected finding is that this is avoidance behavior. By selecting a seemingly random patch of a more extensive grassland area, there is less chance of the nest being discovered by potential predators (especially by people) than if in one of the few ponds in the grassland. If cranes nested in very small grassland patches or within more forested areas, they did select ponds as the nest location was part of a larger forest area and less likely to be found if within one of a multitude of ponds. This also suggests that the main predators cranes are trying to avoid are humans.

Human interaction with and impact on cranes is substantial. Cranes can benefit greatly from human activity in the form of increasing food supply (waste rice grain, maintaining open habitat through burning, with the actual burn itself also useful for cranes and many other birds to find dead animals/insects, as well as creating *Eleocharis* wetlands by retaining water behind dams constructed in floodplains), however, they are negatively impacted by human presence (disturbance), poisoning (when mixed with rice and left on fields targeting rodents), and offtake (cranes are routinely taken as pets or for meat/eggs). This study found that the latter is actually still very high in Cambodia.

6. Describe the success or challenges of the project toward achieving its goal and objectives

I consider, ultimately, that the project proceeded smoothly and achieved its goals and objectives, even though not all data collected has been analysed by the end of the project duration. The nature of the project and request for funding was necessarily focused on field work. There proved to be little time to analyze the data apart from processing samples and entering data in to the computer in between field work.

7. Were there any unexpected impacts (positive or negative)?

The only upset was at Anlung Pring where I was forced to scale back research activities in 2016 as the WWT national project manager was concerned that the research was causing disturbance to the cranes. This was a reaction to lower crane numbers at Anlung Pring in 2015 compared to previous years, which I believe is far more likely to be related to the excessive drought rather than any research activities. I also believe that, as the person in question is also the government official responsible for Anlung Pring, he was by blaming research activities, avoiding his superiors from putting any blame for the lower numbers on himself, although it seems unnecessary as it was clearly related to climate conditions and outside of anyone's control at the time. That this sort of incident occurred is unfortunate, but overall the inability to do anything substantial at Anlung Pring in 2016 was not a huge setback. Such incidents are also probably not an uncommon thing to happen during the course of a project.

The period of fieldwork largely coincided with an extended and severe El Nino system, which was pronounced throughout 2015 and seems to be continuing on to mid 2016 (with cumulative effects). Although this biases some of the results, it is in a way also fortuitous to have had such a drought-stressed period occurring during the study, in terms of assessing wetland conditions and the ability of a crane to cope with such conditions.

Project Activities and Deliverables

Objective 1 (as stated in the approved proposal)

List each activity and deliverable from the proposal

1.1. Study diet of cranes. Fieldwork completed in May 2014. Progress detailed in 1st technical report. Publication in peer-reviewed journal. Section on topic in final report.

1.2. Study foraging activity patterns. Fieldwork completed in May 2015. Progress detailed in 2nd technical report. Section on topic in final report.

1.3. Study key site and wider habitat use and temporal shifts in population distribution. Fieldwork completed in May 2015. Annual Sarus Crane census reports. Progress detailed in 2nd technical report. Section on topic in final report.

1.4. Study changes in juvenile:adult ratios in population. Fieldwork completed in May 2015. Progress detailed in 2nd technical report. Section on topic in final report.

8. Describe the deliverables met under Objective 1

All fieldwork was extended by a year. The study on diet also took place in 2015 and the other activities continued in 2016. No publications have been prepared as yet. Progress has been detailed in interim technical reports and summarized in this final report. Annual Sarus Crane census reports have been made and are available.

Objective 2 (as stated in the approved proposal)

List each activity and deliverable from the proposal

2.1. Study nest site selection at key sites. Fieldwork completed in September 2014. Progress detailed in 1st technical report. Section on topic in final report.

2.2. Study breeding success at key sites. Fieldwork completed in September 2015. Progress detailed in 2nd technical report. Section on topic in final report.

9. Describe the deliverables met under Objective 2

The study on nest site selection was conducted in the wet seasons of both 2014 and 2015 (up to October in both years). Progress has been detailed in interim reports and summarized above. The nest success work will mainly be reliant on data collected by WCS. I and others working with me found only a few nests that WCS staff had not found and I felt obliged to report them to WCS who promptly had people guard them. I will collaborate with WCS on conducting an analysis of nests that ended up without protection vs. nests that were guarded, comparing success rates for the two groups and also comparing the two protected areas in Preah Vihear where WCS works.

Objective 3 (as stated in the approved proposal)

List each activity and deliverable from the proposal

3.1. Assess human disturbance factors, incidents of injury or mortality and landuse change. Progress detailed in technical reports. Publication in peer-reviewed journal. Section on topic in final report.

10. Describe the deliverables met under Objective 3

The human disturbance factor was left out. This actually did not appear to be a major issue in general. Mortality was an issue, with a few cases during the project period. The causes were

largely unknown (one juvenile in 2015 and one in 2016 found by farmers in a very sick/weak state). It is likely to be either ingestion of poison (especially suspected of the bird in 2016, which died shortly after) or lack of food (expected of the bird in 2015, which survived after a period of confinement at a rescue center). Two other juvenile cranes were caught in the Tonle Sap floodplain and then sold to a wildlife trader in Kampong Thom province, who intended to sell them on to a private zoo. Numerous nests failed with some indicating people having taken the eggs. There were at least two incidents of chicks dying before fledging, but there are likely to be more after closer examination of the WCS nest data.

In previous progress reports there has been mention of low water levels at ATT, due to dam maintenance works. It is important for site managers to have control over water levels in the protected wetlands. In this report I have also highlighted how single annual rice cropping systems can benefit Sarus Cranes and it is equally important for conservationists to work with communities in and around sensitive natural areas to keep the agricultural systems extensive. Initiatives that WCS is working on such as Ibis and/or organic rice, plus perhaps other alternative seasonal income and employment opportunities can help, but need to be increased and expanded to benefit management of Ang Trapeang Thmor.

11. If you did not complete any activity or deliverable, how did this affect the overall impact of the project?

Deliverables were completed fully or in part and where in part this was due to a slight shift in focus on other more relevant deliverables under the overall objective and will not have had a major impact on project achievements.

12. Please describe and submit any tools, products, or methodologies that resulted from this project or contributed to the results

I would be happy to send IUCN/CEPF my research proposal to Charles Darwin University and/or the annual Sarus Crane census reports, if needed.

CEPF Global Monitoring Data

Respond to the questions and complete the tables below. If a question is not relevant to your project, please make an entry of 0 (zero) or n/a (not applicable).

13. Did your organization complete the CEPF Civil Society Tracking Tool (CSTT) at the beginning and end of your project? Yes/No

If yes, please be sure to submit the final CSTT tool to the RIT if you haven't already done so.
n/a

14. List any vulnerable, endangered, or critically endangered species conserved due to your project

Sarus Crane (*Grus antigone*) - Vulnerable

Hectares Under Improved Management

Project Results	Hectares*	Comments
15. Did your project strengthen the management of an existing protected area?	12,659 9,276 243,661 1,108 53,543 533,748	<i>KMH1 Ang Trapeang Thmor KM4 Boeung Prek Lapouv KM8 Chhep KM11 Kampong Trach KM34 Stung/Chikreng/Kampong Svay KM37 Upper Stung Sen Catchment</i>
16. Did your project create a new protected area or expand an existing protected area?	0	<i>List the name of each protected area, the date of proclamation, and the type of proclamation (e.g., legal declaration, community agreement, stewardship agreement)</i>
17. Did your project strengthen the management of a key biodiversity area named in the CEPF Ecosystem Profile (hectares may be the same as questions above)	12,659 9,276 243,661 1,108 53,543 533,748	<i>KMH1 Ang Trapeang Thmor KM4 Boeung Prek Lapouv KM8 Chhep KM11 Kampong Trach KM34 Stung/Chikreng/Kampong Svay KM37 Upper Stung Sen Catchment</i>
18. Did your project improve the management of a production landscape for biodiversity conservation	0	<i>List the name or describe the location of the production landscape</i>

* Include total hectares from project inception to completion

Note: the above table filled in under the assumption that research findings will translate to some form of improved management (as related to cranes) and using areas in hectares as given in the Directory of Important Bird Areas in Cambodia, published in 2003.

19. In relation to the two questions above on protected areas, did your project complete a Management Effectiveness Tracking Tool (METT), or facilitate the completion of a METT by protected area authorities? If so, complete the table below. (Note that there will often be more than one METT for an individual protected area.)

n/a

Protected area	Date of METT	Composite METT Score	Date of METT	Composite METT Score	Date of METT	Composite METT Score

20. List the name of any corridor (named in the Ecosystem Profile) in which you worked and how you contributed to its improved management, if applicable.

Tonle Sap lake and inundation zone.

I have contributed, or the results may contribute, to improved management by highlighting the ecological requirements of Sarus Cranes in this corridor.

Direct Beneficiaries: Training and Education

<i>Did your project provide training or education for . . .</i>	Male	Female	Total	Brief Description
21. Adults for community leadership or resource management positions				
22. Adults for livelihoods or increased income				
23. School-aged children				
24. Other	6			Worked as field assistants at ATT, AP and Stoung, collecting data on wetland food availability and related environmental factors

25. List the name and approximate population size of any “community” that benefited from the project.

n/a

Community name, surrounding district, surrounding province, country

Population size

26. Socioeconomic Benefits to Target Communities

n/a

Based on the list of communities above, write the name of the communities in the left column below. In the subsequent columns under Community Characteristics and Nature of Socioeconomic Benefit, place an X in all relevant boxes.

Community Name	Community Characteristics								Nature of Socioeconomic Benefit												
	Small landowners	Subsistence economy	Indigenous/ ethnic peoples	Pastoralists / nomadic peoples	Recent migrants	Urban communities	Communities falling below the poverty line	Other	Increased income due to:				Increased food security due to the adoption of sustainable fishing, hunting, or agricultural practices	More secure access to water resources	Improved tenure in land or other natural resource due to titling, reduction of colonization, etc.	Reduced risk of natural disasters (fires, landslides, flooding, etc)	More secure sources of energy	Increased access to public services, such as education, health, or credit	Improved use of traditional knowledge for environmental management	More participatory decision-making due to strengthened civil society and governance	Other
									Adoption of sustainable natural resources management practices	Ecotourism revenues	Park management activities	Payment for environmental services									

If you marked “Other”, please provide detail on the nature of the Community Characteristic and Socioeconomic Benefit:

Lessons Learned

27. Describe any lessons learned during the design and implementation of the project, as well as any related to organizational development and capacity building. Consider lessons that would inform projects designed or implemented by your organization or others, as well as lessons that might be considered by the global conservation community

It helps to make double sure everyone is clear what to do, especially when working with local communities. Do not assume people understand. Check and recheck. When working through an intermediary the person explaining work to local community members will need to completely understand the method and you need to make sure that person does.

It is difficult to change the method after it has been started. Best is to clearly define a practice period together with the local teams rather than coming in and saying this is what needs to be done and then changing it later. See what works and what doesn't in the clearly defined trial period, adapt and confirm final methods with local team members.

28. Project Design Process (*aspects of the project design that contributed to its success/shortcomings*)

There were many study sites included (six in total) and work took place throughout the year. This meant a lot of moving around and dividing time between various study sites. Having local teams collecting data throughout the season was crucial to ensure continued collection of certain data in between visits.

It would be great to see skills of local community members built up further and have them permanently employed in monitoring and research aspects of conservation projects. As long as significant time is invested in training and supervising them in the first year, they will be able to work independently and thoughtfully later on.

29. Project Implementation (*aspects of the project execution that contributed to its success/shortcomings*)

I believe that having supportive partner organizations (especially people at WCS: Hong Chamnan, Simon Mahood, Alistair Mould, Rours Vann, Thaug Sokha, Mao Khean) and having a reliable and hardworking team, including Kit Sokny (research coordinator), and local team members (AP: Kna, Honda; ATT: Hom, Coin; Stoung: Reng, Kin) was vital to the success of the project.

30. Describe any other lessons learned relevant to the conservation community

For independent researchers and/or outside organizations, to work in Cambodia, partnering with a strong and reliable organization is vital.

Sustainability / Replication

31. Summarize the success or challenges in ensuring the project will be sustained or replicated

I believe that the results from this research project will be translated in to future conservation action as key organizations have either been directly involved or are very interested in the findings. The timing of a Sarus Crane action planning workshop shortly after conclusion of this project is not a coincidence and it is my hope that when the remaining data are analyzed further these too will be incorporated by conservationists working to improve the status of Sarus Cranes. There is still much exciting conservation work and research to be done, especially on integrating the ecological needs of cranes with the economic needs of people. There is still room for optimism in this regard as long as the momentum is sustained. In India, parts of Europe, Australia and the U.S.A. crane populations are not threatened

despite spending most of their time within human-modified landscapes. One key similarity between these regions: hunting/persecution levels are much lower.

32. Summarize any unplanned activities that are likely to result in increased sustainability or replicability

1. A Sarus Crane action plan, provided it is implemented, including:
 - a. Habitat management (especially controlling water levels in Eleocharis wetlands, halting habitat conversion (esp. nesting grasslands to rice) in protected deciduous forests)
 - b. Increasing the area of wetlands, floodplain grasslands under some form of protection (designating more protected areas and/or improving protection of such habitats within the Tonle Sap Biosphere Reserve and/or working with local communities at a landscape level – integrating farming systems with conservation)
 - c. Working with local people on maintaining traditional farming systems and introducing innovative income generating schemes that are compatible with conservation goals
 - d. Changing attitudes of local people living near conservation areas and/or national campaigns to reduce hunting
2. Final analysis of data collected and publication
3. Further research, especially on:
 - a. Various causes of mortality
 - b. Agricultural practices that are beneficial to wildlife

Safeguards

33. If not listed as a separate Project Component and described above, summarize the implementation of any required action related to social, environmental, or pest management safeguards

n/a

Additional Comments/Recommendations

34. Use this space to provide any further comments or recommendations in relation to your project or CEPF

Additional Funding

35. Provide details of any additional funding that supported this project and any funding secured for the project, organization, or the region, as a result of CEPF investment

Donor	Type of Funding*	Amount	Notes
Charles Darwin University	A	37,960	Scholarship and other internal grants
Wildfowl & Wetlands Trust	B	1,000	Supplementary funding to cover part of the costs of hiring local team at AP in 2015
The Rufford Small Grants Foundation	B	7,000	Supplementary funding to cover part of the overall project costs in 2016

** Categorize the type of funding as:*

- A Project Co-Financing (other donors or your organization contribute to the direct costs of this project)*
- B Grantee and Partner Leveraging (other donors contribute to your organization or a partner organization as a direct result of successes with this CEPF funded project)*
- C Regional/Portfolio Leveraging (other donors make large investments in a region because of CEPF investment or successes related to this project)*

Information Sharing and CEPF Policy

CEPF is committed to transparent operations and to helping civil society groups share experiences, lessons learned, and results. Final project completion reports are made available on our Web site, www.cepf.net, and publicized in our newsletter and other communications.

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