

Project title:

Identification of elephants in conflict with people using molecular techniques.

3-15 Interim report

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Project starting date: **March, 2015**

Anticipated completion date: **February, 2016.**

Conservation needs

A wide range of methods are used by governments, wildlife departments, NGOs and local communities to minimize crop damage by elephants, ranging from traditional methods such as noise making or chasing to construction of physical barriers, electric fencing and even occasional killing. Nevertheless, no single method has been entirely successful in preventing crop raiding. Moreover, animosity towards elephants among the local communities erodes goodwill towards the species and efforts for its conservation. Even in regions where elephant populations are on the rise due to successful conservation strategies, there is a need to minimize conflict to ensure sustainable co-existence with people into the future.

An assessment of the nature of conflict (whether by habitual or occasional raiders), accurate identification of habitual crop-raiders and information about their raiding frequency and ranging patterns can provide vital clues to devise effective mitigation measures and reduce conflict in the region.

Summary of goals and objectives

We aim to use molecular techniques to identify crop-raiding elephants to gain a better understanding of the acute levels of conflict in the Kodagu district of Karnataka (southern India). Through our study, we plan to estimate the proportion of crop raiders versus non-raiders, the proportion of habitual raiders versus occasional raiders and the proportion of male versus female crop raiders in the region, across a habitat fragmentation gradient. We also plan to explore whether the patterns of crop raiding by habitual crop raiders is correlated with seasonality and crop types.

Actions taken

Sample collection: Through our continued presence in the Kodagu region, we were able to build networks among the local community to obtain information about the location of raiding elephants and regions with high conflict. The peak crop raiding started in December 2014, and continued upto February 2015. We were able to collect about 150 samples from crop raid sites that were located in paddy fields as well as within coffee and other plantations in the region.

Molecular analyses:

In line with our proposed objectives 1 and 2, we were able to extract DNA and conduct PCR analyses for molecular sexing of 44 samples in the last 6 months, with an amplification success of ~87% as compared to ~53% last year. This brings the total number of samples analyzed by molecular sexing so far to 106. All extractions were repeated at least twice per dung sample, and molecular sexing PCRs were repeated at least twice per extraction to ensure consistency in the results.

Towards objectives 1, 2 and 3, we also carried out microsatellite analyses for 14 dung samples at eleven loci. Only those samples that showed good amplification success in the molecular sexing PCR were selected for the microsatellite analyses. Most of the loci were amplified well in all the fresh dung samples tested so far, and heterozygous and homozygous alleles identified. However, the microsatellite PCRs need to be repeated with another independent extract in order to check for consistency.

Our activities did not differ from the originally proposed activities except for one addition. We collected dung samples from 10 known captive elephants, which are currently being analyzed using eleven different microsatellite loci. These data would be used to validate the efficacy of our molecular approach in individual identification, and the analytical methods used.

Conservation outcomes

Our results would provide valuable information to devise measures for reducing crop raids that could be specifically customized to a few habitual raiders that may be causing most of the damage versus raiding that is found to be largely opportunistic. These observations would also have wide-ranging lessons for the study of elephant-human conflict, and subsequently, for informing policy decisions across the entire habitat of the Asian and African elephant.

The major findings and accomplishments to date are

- We standardized the DNA extraction protocol from dung samples to obtain good amplification success using the protocol from Fernando et.al. (2003).
- We adapted the molecular sexing protocol from Ahlering et. al. (2011) for Asian elephants.
- We observed that amplification success decreases with increase in the dung sample age. This has implications for our sample collection strategy in the future, with a strong need to minimize the delay between a raid, and sample collection.
- We expanded our communication network within the local people, thus enabling faster response to crop raids, and collection of fresher samples that would enable better amplification success in the molecular analyses.
- We carried out molecular sexing of 44 samples in the last five months, of which 28 were found to be male, 10 females and 6 (13.6 %) remained undetermined. This was a significant improvement on the samples analyzed through the 2014 grant, where many samples were collected 5 days (or more) after the crop raid, and consequently the sex of 29 out of the 62 samples (46.7%) could not be determined.
- We standardized the PCR and genotyping conditions for 11 microsatellite loci. These loci are being used for the genotype analysis of the samples to determine individual identity. We have already generated partial data for 14 dung samples, and are in the process of repeating the analyses to gain confidence in the results. We are also planning to carry out microsatellite analyses for more dung samples.
- We collected an additional 150 dung samples from crop raid sites in paddy fields and plantations.
- We also collected dung samples from 10 known captive elephants to validate the efficacy of our molecular approach in individual identification using microsatellites.

Short term goals: To identify the gender and individual identity of crop raiding elephants from dung samples collected from agricultural fields as well as coffee and other

plantations.

Long term goals: To identify habitual crop-raiders in the Kodagu region and determine the proportion of habitual raiders in the population, the proportion of habitual raiders versus occasional raiders and the proportion of male versus female crop raiders in the region. We would also like to explore patterns of habitual crop raiding with respect to seasonal changes and crop type. We plan to use this information to devise measures for reducing crop raids that could be specifically targeted at deterring the identified habitual crop raiders in the region

Summary of progress

In the last six months, we have collected 150 samples from crop raid sites in agricultural fields as well as coffee plantations. We carried out molecular sexing of 44 individuals, with 28 male, 10 female and 6 undetermined. We were able to expand our network of information within the local communities, and were able to obtain information about crop raids faster, and therefore collect fresher samples. This has helped reduce the number of samples with poor amplification very significantly as compared to last year.

We started microsatellite analyses of 14 dung samples collected from crop raid sites, and are in the process of generating more data for analyses. We are also in the process of generating molecular IDs from known individuals (captive elephants) to validate the analytical methods used for determining molecular IDs.

Details of images

1. Map of the study site with locations of the sampled crop raid sites from where samples were collected
2. An effective elephant proof trench_Photo by Aditi Sridhar
3. An elephant proof trench in poor condition_Photo by Ishani Sinha.jpg
4. An elephant proof fence_Photo by Aditi Sridhar
5. A chilli fence_Photo by Ishani Sinha