

The Rufford Foundation Final Report

Congratulations on the completion of your project that was supported by The Rufford 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	Abdullahi Hussein Ali
Project title	UNDERSTANDING RESOURCE SELECTION AND MOVEMENTS OF HIROLA TO INFORM FUTURE REINTRODUCTIONS
RSG reference	14852-B
Reporting period	2014-2015
Amount of grant	12000
Your email address	ali@primateresearch.org
Date of this report	2015-06-21

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. Understand hirola resource selection and movements			Fully achieved	Manuscript currently under review (available on request). Title: Resource selection and range collapse of the critically endangered hirola antelope: a secondary extinction debt following megaherbivore declines in eastern Kenya. Target Journal: Conservation Biology
#2. Evaluate tolerance of pastoralists towards range management solutions			Fully achieved	Manuscript complete (available on request). Title: Evaluating support for range-restoration practices by rural Somalis: an unlikely win-win for local livelihoods and the world’s most endangered antelope? Target Journal: Conservation Biology
#3. Make a management recommendations to stakeholders			Fully achieved	Progress report shared with all stakeholders and donors including RSG

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

We have not encountered any unforeseen difficulties during this project period. However, insecurity has been a major issue in our project area (Garissa County, Kenya) and occasionally interrupted our operations. To cushion our team from any unforeseen risks, we hired additional armed security rangers during this project period. The government has recently imposed night curfew in this region while also restricting gatherings of people. This has caused us not to hold our final stakeholder workshop that we earlier planned but instead we used alternative channels to disseminate our results i.e., village specific meetings and circulation of progress report.

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

A: Hirola range collapse through long-term satellite imagery analysis: During this project period we have shown the geographic range of hirola has contracted and collapsed over the past 27 years as a result of increasing tree cover. Between 1985 and 2012, the historic range of hirola has experienced a >250% increase in tree cover (Fig. 1) such that less than 20% of the historic range is still available as

grassland. Hirola subsist almost entirely on grasses; therefore, any factors shifting open, grass-dominated savanna to tree-encroached woodland have the potential to negatively impact populations. While factors such as disease might have triggered hirola decline, habitat loss stemming from increased tree cover is likely to be preventing contemporary recovery. Factors such as predation and competition with livestock are mediated by habitat. Therefore, we believe recovery of hirola in its historic range is unlikely unless measures are taken to improve range quality in targeted areas of Ijara and Fafi Districts.

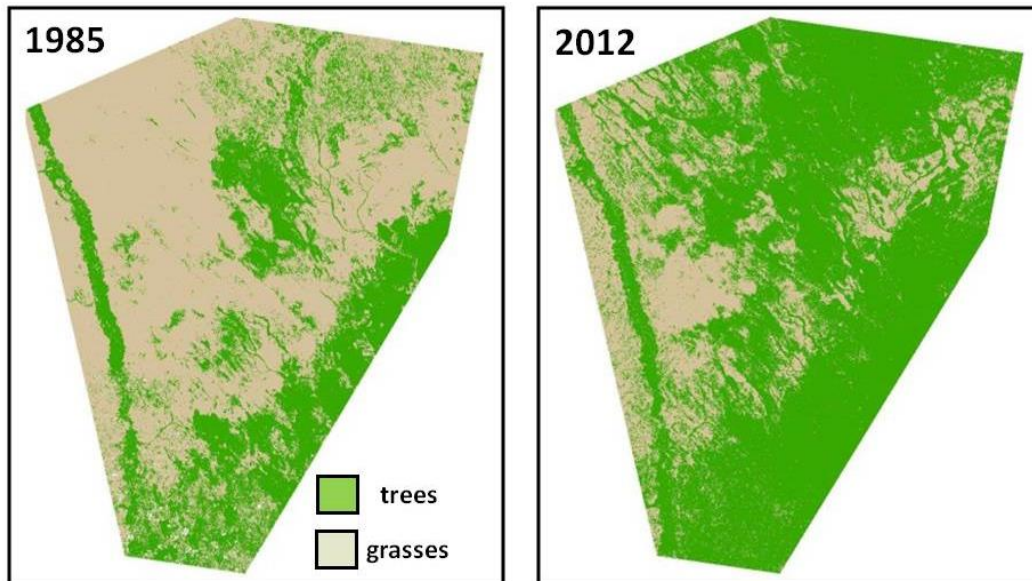


Fig 1: Changes in tree cover across the hirola's historic range from 1985 to 2012. Green represents tree cover and brown represents grasslands. The green linear feature at the west of both images is the Tana River. Note the stark decrease in grassland between 1985 and 2012.

We conclude that range degradation is poised to cause hirola extinction, and the recovery of this species hinges ultimately on restoring grasslands in its native range. Interactions between range degradation (increased tree cover) and predation (following the recent recolonisation of large carnivores to Ijara) may exacerbate hirola declines and merits further investigation.

B: Development of resource selection functions (RSFs) and assessment future reintroduction sites:

To understand how increases in tree cover affected habitat selection and movements of hirola, we constructed resource selection functions (RSFs) based on historical (1985) and contemporary (2012) factors (Fig. 2). An RSF model is generated using a collection of animal locations that are contrasted with a set of locations that represent the availability of habitats or random distances to some feature. Using a combination of GPS telemetry, aerial survey data, and GIS layers for habitat features, we compared historical and contemporary habitat selection of hirola. We were particularly interested in whether the amount of high-quality habitat had changed between 1985 and 2012 and, if so, identifying the areas in which high-quality habitat still occurs.

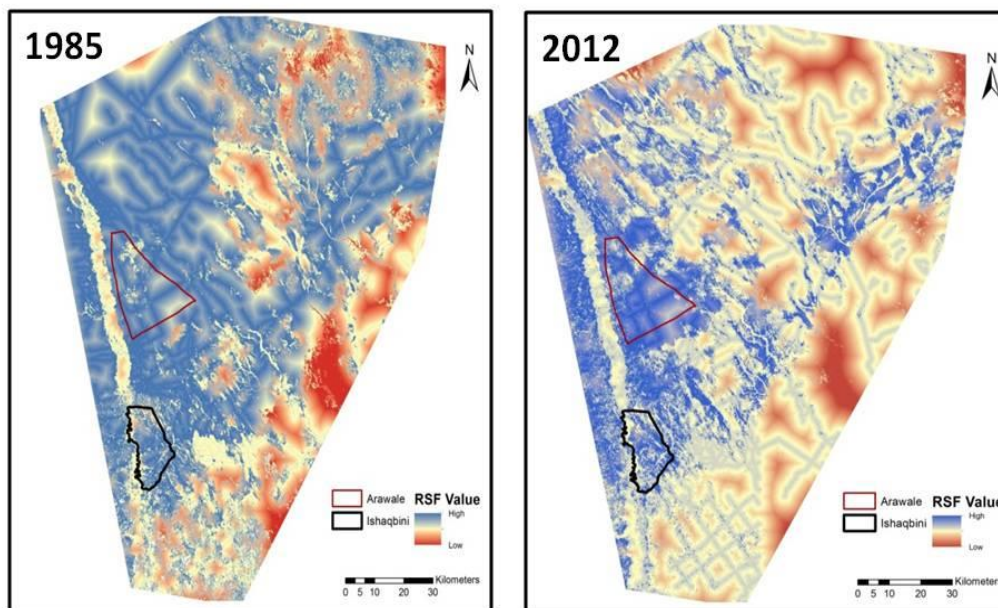


Fig 2: Historical (1985) and contemporary (2012) predictions of high-quality habitat for hirola during the wet season. High-quality habitat is represented in blue; low-quality habitat is represented in red. Note the contraction of high-quality habitat from 1985-2012, and the persistence of high-quality habitat in the eastern parts of the hirola’s native range. Arawale National Reserve is outlined in red; Ishaqbini Community Conservancy is outlined in black.

We used a ~ 2 years of hirola movement data for this analysis to examine the extent to which of habitat characteristics (see below) were selected or avoided.

We evaluated habitat selection based on distance to the nearest village, distance to water, distance to roads, and tree cover, and combined this with movements from GPS-telemetered hirola to identify high-quality habitat. As expected, hirola strongly avoid tree cover, and select for grasslands. Hirola also avoid roads and villages. Between 1985 and 2012, changes in tree cover affected the amount and distribution of high-quality habitat for hirola; currently, only the southeastern portion of the hirola’s range (most notably around Arawale National Reserve and Ishaqbini Community Conservancy) represents high-quality habitat. We expect that Arawale and Ishaqbini are necessary but insufficient for hirola conservation in the long-term. These areas are “core” habitats to which hirola retract in the wet season. However, our data on hirola movements demonstrates that hirola expand their home ranges in the dry season, so full potential for long-term conservation can only be realised if range is restored outside Arawale and Ishaqbini. To our understanding, the overarching motivation of translocating individuals in the predator proof sanctuary on Ishaqbini was to serve as a source for future reintroductions. Our efforts provide a “map” of where such reintroductions are most likely to be successful, based on the best data that currently are available. These sites should be considered as starting points for potential reintroduction. We believe that this analysis will help ensure that hirola are not relegated to a “put and take” strategy in which individuals are reintroduced with little hope of survival in their historic range.

C: Evaluating tolerance of pastoral Somalis towards range restoration: Possible management strategies to reverse range degradation include manual removal of trees, core area resting, livestock reduction, controlled burns, elephant reintroductions, soil ripping, seeding and fertilisation. Before

attempting to implement any of these interventions, we must first take into account the perspectives of local Somali communities. Consequently, we administered questionnaires to villages within the hirola's historic range and built classification and regression trees (CART) to understand the predictor variables (age, gender, education, livestock number, length of residency) that best accounted for community perceptions.

In summary, locals expressed strong support for manual removal of trees, seeding and fertilising, elephant protection/reintroduction and core area resting for wildlife and livestock (Table 1). Locals are ambivalent about controlled burning, and oppose livestock reduction and soil ripping as range restoration options. Livestock numbers and education level are the main predictors accounting for community perceptions, with more educated community members generally in favor of range restoration efforts, and community members with more livestock generally opposed to range restoration efforts.

Table 1. Response frequencies to questions on range restoration solutions for improving hirola habitat in Ijara and Fafi districts.

	Frequency (%) of responses to restoration questions						
	n = 131						
Response variable	Livestock reduction	Soil ripping	Controlled burning	Core area resting	Seeding and fertilization	Manual removal of trees	Elephant reintroduction
1.Strongly disagree	44.3	30.5	43.5	22.1	16.8	2.3	4.6
2. Disagree	16.8	17.6	4.6	13	7.6	5.3	5.3
3. Neutral	1.5	12.9	8.4	8.1	3.1	6.9	3.8
4. Agree	33.6	27.5	30.5	46.6	7.6	68.7	69.5
5.Strongly agree	3.8	11.5	13	10.2	64.9	16.8	16.8
In agreement	37.4	39.0	43.5	56.8	72.5	85.5	86.3
In disagreement	61.1	48.1	48.1	35.1	24.4	7.6	9.9
Neutral	1.5	12.9	8.4	8.1	3.1	6.9	3.8

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

While much of this work has been technical research, communities have had a chance to participate in the questionnaire survey to determine acceptability of range restoration solution. In addition, we have held five village-based meetings to share the outcomes of this research with local communities. All of our projects scouts (12) are members of local Somalis who benefited both from trainings and employment potentially improving livelihoods while instilling conservation culture among locals.

5. Are there any plans to continue this work?

YES. To improve habitat for hirola and livestock in this area, we are proposing to initiate long term range restoration project for hirola. Our objectives will hinge on reduction of bush encroachment, improvement of grass cover area and promotion of core area resting for livestock and wildlife. In addition, and contingent on further support from RSG, we will initiate strong local anti-poaching program that will aim to protect existing elephant herds from poaching across the hirola range. In addition, we also propose to promote rainfall-harvesting strategies in the area in order to motivate support for both hirola conservation and locals' needs. This is informed by the fact that the regions dry climate can benefit immensely from runoff and flash floods during the rain seasons, which often flow away into the Indian Ocean.

To meet our goals we will peruse the following objectives:

- 1) Manual clearing of bush and retention of cut trees in order to protect seeds from dying and enhance growth of grass across the 1-hectare replicates within the habitat/range.
- 2) Seeding and reseedling of locally adaptable grasses/historically abundant grasses across the cleared areas within the hirola habitat/range.
- 3) Actual protection / conservation of elephants from poaching so as to facilitate bush clearing
- 4) Evaluation of responses of hirola and other ungulates to range restoration

Our main goal is to increase habitat available for hirola and ultimately increase population from the current numbers to a reasonably sustainable population with the involvement of locals in the area.

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

By the end of 2015, I am giving a series of invited talks to several organisations locally and internationally including the Kenya Wildlife Service in December 2015, East African Wildlife Society in January 2016 and Zoos and Aquarium committing to conservation conference (ZACC), in Denver, USA, in October 2015 and to the Hirola Management Committee in December 2015. Therefore, I am hoping to use these forums to pass the message and rally further support for hirola conservation. In addition, I am publishing all the work we have done so far in peer-reviewed journals to ensure we reach wider audience.

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

The grant was spent within the 2014-2015 year and fits well with anticipated project period.

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
Good field research Motorbike	2000	2000	nil	This grant has allowed us to purchase an excellent off-road motorbike that greatly improved our operations in Ijara, Kenya.
Camera zoom lens	400	400	nil	We acquired new powerful zoom lens for our field camera.
Vehicle maintenance fuel 12 months@166/per month	2000	2000	nil	Because of the roughness of the terrain, we service our vehicle and motorbikes on a monthly basis and your support permitted us to sustain our effort.
Occasional security escorts for 1 year	1000	2500	1500	Because of increased insecurity in the Kenya-Somali border, we have been forced to take extreme cautions and hire security escorts particularly when monitoring herds in outlying areas.
PI salary for 1 year (partial)	2000	2000	nil	This was used to defray expenses associated with the PI salary.
Partial support for 12 scouts' salaries @ 175 per year	2100	2100	nil	This supported the 12 scouts entirely under the hirola conservation program
Five community meetings for 2014 @ 200 per meeting	1000	1000	nil	This was used to defray expenses associated with meetings such as refreshment, mobilisation etc.
Final stakeholders Workshop	1500	0	1500	We have used the difference to hire security escorts for our team.
Total	12,000.00	12,000.00	1,500.00	

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

The next step for hirola and the most urgent will be to improve range for hirola and livestock in the area in order to promote long-term co-existence of pastoralists and wildlife in the area. This is likely to reverse the lack of contemporary recovery of the world's most endangered antelope witnessed in the past three decades. In addition, further research is recommended to understand interactions between range degradation (increased tree) and predation following the recent recolonisation of large carnivores in Ijara, eastern Kenya. We will tackle this problem in the coming years and we will address the question of how predation level varies with varying level of tree cover. We will use this study in combination with our past efforts to identify management strategies that integrate carnivore conservation, endangered species recovery and local livelihoods.

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

Yes; we have used the RSG logo in numerous scientific presentations both in Kenya and outside thereby providing necessary publicity for RSG.

11. Any other comments?

I would like to take this opportunity to thank the Rufford Board of Trustees for their continued support and for committing to save the world's most endangered antelope in partnership with local groups. Thank you again for giving us the opportunity to address our own conservation issues and for building capacity of locals.