Final Evaluation Report

We ask all grant recipients to complete a project evaluation that helps us to gauge the success of your project. This must be sent in **MS Word and not PDF 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 – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please DO NOT fill in and submit this form until the project has been completed.

Complete the form in English. Note that the information may be edited before posting on our website.

Please email this report to jane@rufford.org.

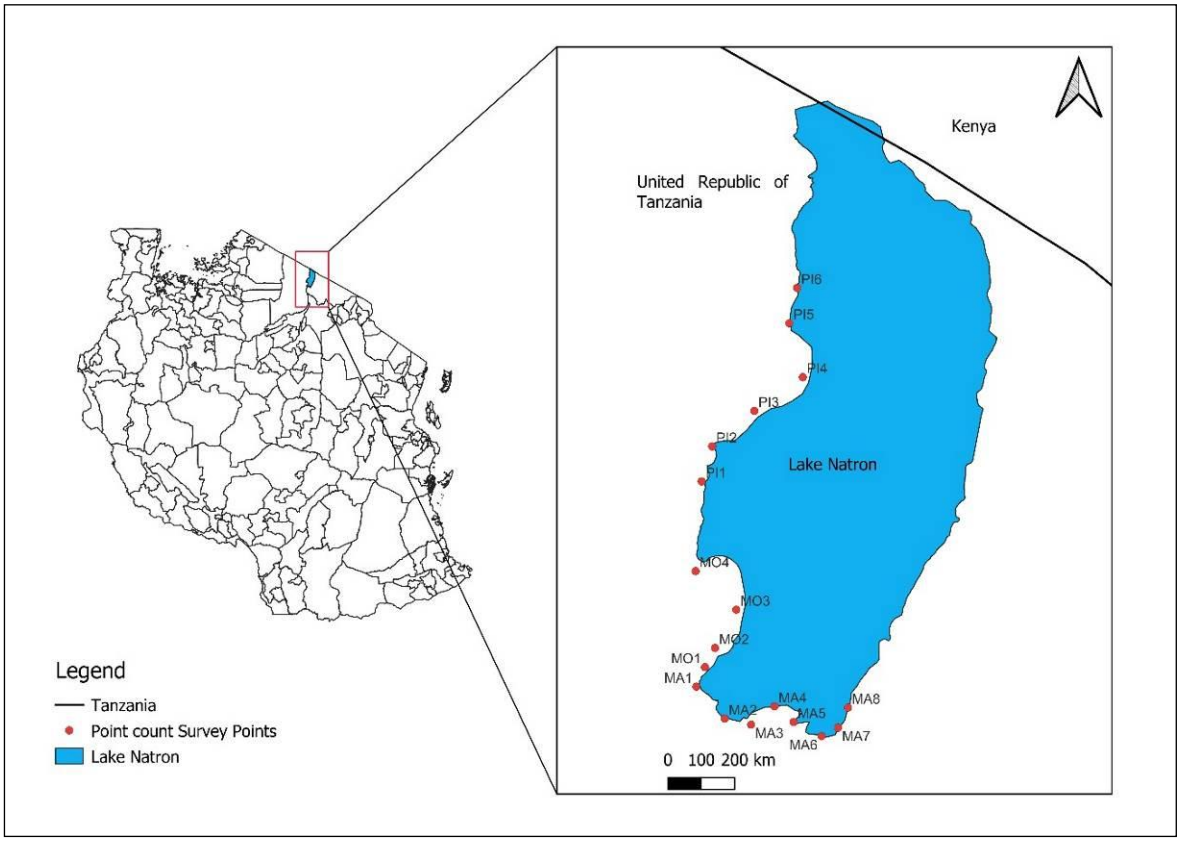
Your Details	
Full Name	Akshita Dinesh Rabdiya
Project Title	Population Monitoring and Migration Patterns of the Lesser Flamingo Phoeniconaias minor at Lake Natron, Northern Tanzania
Application ID	44874 - 1
Date of this Report	02 February 2026

1. 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
Population surveys of Lesser Flamingo at Lake Natron			√	All scheduled surveys were conducted during the year, allowing robust estimates of adult and juvenile counts across major sections of Lake Natron. Survey logistics were well supported by TAWA and local guides.
Capture, tag and track the movement of at least two Lesser Flamingos with GPS-enabled transmitters			√	Two individuals were successfully captured and tagged in collaboration with the University of Dar es Salaam team. GPS transmitters performed reliably, providing high-resolution data on daily movements and regional dispersal.
Identify and map the locations of critical breeding and foraging sites within Lake Natron		√		Key foraging and colony sites were mapped; however, this objective remains partially achieved because an additional round of Lesser Flamingo tagging was completed in December 2025. Movement data from this new deployment will require at least six more months to refine habitat-use mapping and confirm site prioritization.
Analyse the impact of environmental factors like rainfall, water level and water physio-chemical parameters on the flamingo population			√	Data on rainfall, water level, temperature, DO, and pH were successfully analysed. Statistical outputs show clear associations between water conditions and population fluctuations, supporting long-term habitat monitoring needs.

2. Describe the three most important outcomes of your project.

a) Enhanced understanding of spatial population variation and movement patterns supported by traditional ground surveys and drone-based monitoring

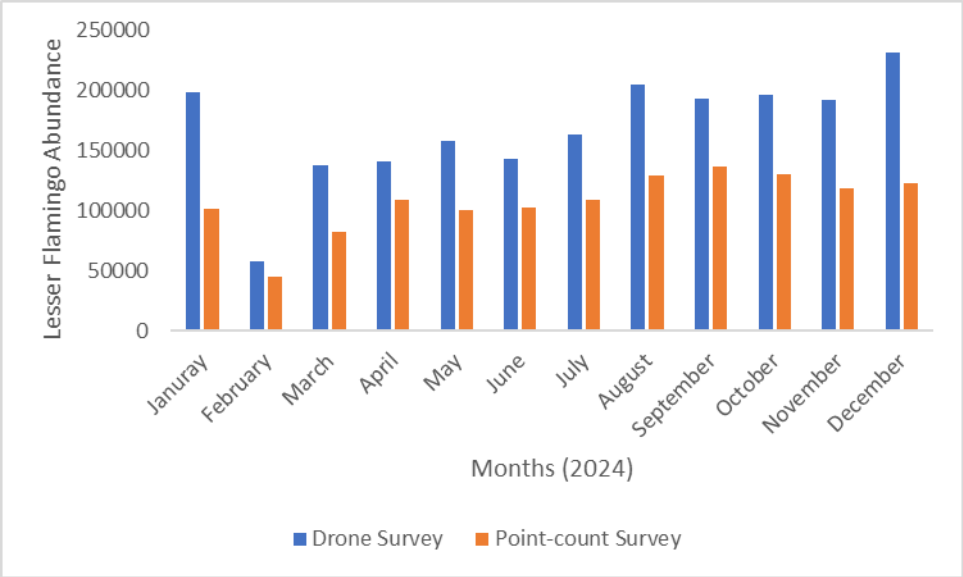


Map 1: A map depicting the Point-count surveys and Drone surveys around Lake Natron. A total of 8 survey points at Magadini (MA1-MA8), 4 survey points at Monik (MO1-MO4) and 6 survey points at Pinyinyi (PI1-PI6) were established.

We conducted a total of 13 drone surveys (n=41 days) and 13 ground surveys (n=96 days), including the breeding survey days (n=15 days in March), throughout a year. The project substantially improved understanding of spatial variation in Lesser Flamingo populations across Lake Natron by combining traditional ground surveys with drone-based monitoring, each serving distinct but complementary roles. Ground surveys enabled detailed, close-range observations of flock composition, breeding behaviour, chick survival, and habitat conditions such as substrate type and disturbance levels. These surveys were particularly important for interpreting ecological processes at colony sites and validating observations made from aerial data.

In contrast, drone-based surveys provided a landscape-level perspective, allowing accurate population counts and spatial mapping across large and inaccessible sections of the lake. Drones were especially effective during periods of high water and unstable terrain, when ground access was restricted or unsafe. Aerial imagery captured real-time shifts in flock distribution between breeding islands, shallow foraging areas, and peripheral wetlands in response to changes in water depth, salinity, and rainfall.

Importantly, drone surveys minimized disturbance to breeding colonies while enabling repeated monitoring of large aggregations with high precision.



Graph 1: Lesser Flamingo count using Drone survey vs Ground surveys (using Point-count method) at Lake Natron, Tanzania

The integration of fine-scale ground observations with broad-scale drone imagery produced a comprehensive, spatially explicit dataset that strengthened the project's ability to track population trends, interpret habitat-use patterns, and support evidence-based conservation interventions. This combined monitoring framework now provides a robust model for long-term surveillance of Lesser Flamingo populations at Lake Natron.

Photo 1: Drone imagery of aggregation of ~10,000 Lesser Flamingos at Magadini village around Lake Natron

b) **Strengthened scientific evidence and enhanced policy advocacy for the protection of Lake Natron**

The project generated robust ecological and environmental data that significantly strengthened ongoing policy and advocacy efforts to safeguard Lake Natron. High-resolution population surveys, habitat mapping, and environmental analyses provided concrete evidence of the lake's ecological sensitivity and its irreplaceable role as the primary breeding site for the Lesser Flamingo. These datasets were instrumental in supporting conservation arguments during the re-emergence of the proposed soda ash mining initiative at Wosi Wosi village, a development that poses severe risks to the hydrological and ecological integrity of Lake Natron. Using project findings, the team actively engaged in awareness and policy dialogues at national and regional levels. Notably, the project contributed to advocacy efforts presented at COP15 of the Ramsar Convention on Wetlands held in Victoria Falls, Zimbabwe (23–31 July 2025), where Lake Natron was highlighted as a globally significant but highly vulnerable wetland. This outcome demonstrates how scientific evidence from the project translated directly into conservation decision-making, strengthening national and international support for long-term protection of the site.

Photo 2: Participation in Ramsar COP15 to raise awareness on Lake Natron at Victoria Falls, Zimbabwe

c) **Documentation of two Lesser Flamingo breeding events at Lake Natron within one year**

A major outcome of the project was the detection and documentation of two separate breeding events in 2025—one in March and a second, smaller event in December. Such dual breeding within a calendar year is ecologically significant and reflects both the resilience and vulnerability of the species. The March 2025 breeding attempt involved approximately 45,000 nests; however, only about 15% of the chicks survived. Field observations and environmental data suggest that this low success rate resulted from unusually high rainfall, rising water levels that inundated parts of the colony, and disturbance associated with tourism activities near breeding zones. The smaller December 2025 breeding attempt also faced similar environmental pressures. These findings underscore the delicate balance between environmental stability and reproductive success for flamingos and highlight the urgent need to maintain strict habitat protection measures, regulate tourism activities, and monitor hydrological changes driven by regional climate variability.

Photo 3 (upper) & 4 (lower): Successful breeding event recorded at Monik village around Lake Natron, recording ~40,000 breeding pairs

d) **Successful deployment of GPS–GSM tags on Lesser Flamingos and new insights into movement patterns**
One of the most significant outcomes of the project was the successful tagging of two Lesser Flamingos at Monik Village, marking an important step forward in understanding post-breeding movements from Lake Natron. The first bird, tagged in August 2025 and named *Leslie*, has consistently utilised Ngorongoro Crater Lake as a key feeding site, highlighting the ecological connectivity between Lake Natron and highland crater lakes. The second individual, tagged in December 2025 and named *Childress*, has moved to Engaruka Crater Lake — a site that had not previously been surveyed by our team and is poorly documented in flamingo research.

These movements demonstrate the importance of lesser-known lakes as critical foraging habitats and emphasise the need for a broader landscape-level conservation approach beyond Lake Natron alone. Furthermore, we have secured two additional GPS–GSM tags through in-kind support from renowned aerial photographer Paul Mzkenzie, which will allow us to expand the tracking component of the project and strengthen our understanding of seasonal dispersal and habitat use.

Photo 5: Tagging and Release of Leslie and Childress

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

a) **Accessibility of roads and extreme environmental conditions**: Access to several parts of Lake Natron, particularly around Pinyinyi, proved more difficult than anticipated. Road conditions were poor, and budget constraints limited

the team to using motorcycles rather than 4x4 vehicles, as the increasing tourism demand had pushed car-hire costs beyond the project's capacity. Fieldwork was further challenged by extreme temperatures, frequently exceeding 40°C, which made full-day field sessions physically taxing. To mitigate these constraints, the team adjusted field schedules, used temporary shelters for shade while observing breeding colonies, and restricted mid-day activities to reduce heat-related risks. Despite the challenging conditions, adaptive planning allowed the field team to maintain data collection without compromising safety.

Photo 6: Field vehicle stuck in soft saline mud during survey operations at Lake Natron, highlighting challenging terrain conditions.

b) Safety challenges while entering the water and difficulties in capturing flamingos: Stepping into the lake for water sampling and placing capture equipment emerged as one of the most hazardous components of the project. The soft mud, hidden deep-water pockets, and unstable substrate made movement unpredictable and slow. Setting traps systematically was difficult, and several attempts took considerably longer than planned. Team members occasionally became stuck in mud up to waist level, which raised safety concerns. To overcome these challenges, experienced local trappers—who possess intimate knowledge of the lake's micro-terrain—were engaged and trained in the project's procedures. They were also provided with safety boots to protect against the extreme heat of the lake surface. Several capture attempts were rescheduled due to unsuitable weather or rising water levels. This combination of local expertise, safety equipment, and flexible planning enabled the successful tagging of flamingos while minimising risk to personnel.

Photo 7 (Left) and 8 (Right): Challenges faced during the monitoring events and use of shade to record the behaviour of Lesser Flamingos

c) **Ensuring long-term sustainability of the project**: A key unforeseen challenge was the need to secure pathways for the long-term sustainability of monitoring and research beyond the grant period. The dynamic nature of Lake Natron, the re-emergence of potential industrial threats, and the need for continuous environmental tracking demonstrated that a single phase of fieldwork was insufficient. To address this, the project strengthened partnerships with the University of Dar es Salaam, Nature Tanzania, and local communities to ensure continuity of data collection and advocacy. Capacity-building efforts, including training local guides and trappers, were prioritised to create a community-supported monitoring framework that can persist beyond the initial grant support.

4. Describe the involvement of local communities and how they have benefitted from the project.

a) Local communities played an essential role throughout the implementation of the project, contributing knowledge, logistical support, and field collaboration. Community members (n=4; one from each village) from Pinyinyi, Monik, Magadini and Engare Sero were directly involved in ground surveys, water sampling activities, and flamingo capture operations. Their familiarity with the lake's terrain—particularly the hazardous mudflats and shifting shoreline—was invaluable for navigating difficult sections of the study area and ensuring the safety of field personnel. Local trappers (n=6; including trappers from Monik village and two field assistant from Enagare Sero village), who possess traditional knowledge on movement across unstable ground, were integrated into the field team and received hands-on training in species monitoring, ethical bird handling, and equipment deployment.

b) The project provided several tangible benefits to these communities. First, participants gained new skills in ecological monitoring, drone-assisted surveys, and field safety protocols, enhancing their capacity to engage in future conservation or research initiatives.

c) By involving community members in discussions on threats such as the proposed soda ash mining project, the project strengthened local awareness of Lake Natron's ecological importance and empowered communities to participate actively in conservation advocacy.

Photo 9: Macho, our field assistant helping in data collection of breeding colonies of the Lesser Flamingos at Monik village around Lake Natron

This project fostered stronger relationships between local communities and Nature Tanzania creating a more cohesive platform for long-term protection of Lake Natron. This collaboration has laid the foundation for community-supported monitoring efforts that can continue beyond the project's duration, ensuring both ecological and socio-economic benefits for local stakeholders.

5. Are there any plans to continue this work?

Yes. Several strategic plans are in place to ensure continuity and expansion of the work initiated through this project. The research team, in collaboration with the University of Dar es Salaam, Nature Tanzania, TAWA, and local communities, intends to continue long-term monitoring of Lesser Flamingo populations and environmental conditions at Lake Natron. The GPS-tracking component will be extended as additional movement data from the December 2025 tagging effort become available, enabling a more comprehensive assessment of seasonal movement patterns and habitat use.

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

During the project, we actively raised awareness of the ecological importance of Lake Natron as the only breeding site for Lesser Flamingos in East Africa, engaging audiences at both national and international levels. Local communities were sensitised to the conservation value of the lake and to emerging threats, particularly the potential impacts of soda ash mining and other large-scale developments on critical breeding and foraging habitats.

However, we recognise that awareness alone is not sufficient for long-term conservation. Continued monitoring of flamingo populations and breeding attempts is essential to inform adaptive management and conservation planning. To support this, we plan to maintain strong

engagement at the local level by promoting ethical and regulated tourism practices, training local field guides in basic scientific monitoring techniques, and fostering community-led stewardship of Lake Natron's resources.

Additional efforts will be made to further sensitise communities in areas facing renewed industrial pressure, particularly around Wosi Wosi village, where the proposal for a soda ash plant has re-emerged. These activities will focus on helping local residents understand the ecological importance of Lake Natron and the long-term benefits of conservation-oriented livelihoods. As part of this approach, we aim to encourage and support the development of sustainable tourism initiatives in Wosi Wosi and Magadini villages. While tourism has already provided tangible socio-economic benefits to communities around Engare Sero, expanding similar models to other villages will help ensure more equitable benefit-sharing and strengthen local support for conservation.

In parallel with these outreach efforts, the project has generated strong scientific outputs. We are developing three peer-reviewed scientific manuscripts based on the project findings, one of which has already been submitted, with the remaining two currently in preparation. These publications will contribute critical evidence on flamingo population dynamics, breeding ecology, and habitat use at Lake Natron, further strengthening the scientific basis for conservation and policy advocacy.

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

a. Continued population and breeding monitoring – Sustained surveys are essential to track seasonal and annual fluctuations in flamingo numbers, assess the success of breeding attempts, and identify emerging threats to colonies. The additional data from the December 2025 tagging effort should be fully analysed over the next twelve months.
b. Expanded GPS tracking, ringing and drone-based surveys – Deploying additional GPS tags, ringing of juveniles as well as adults and continuing drone-assisted monitoring will provide high-resolution insights into habitat use, movement patterns, and responses to environmental changes, particularly during extreme weather events.
c. Community engagement and capacity building – Strengthening local involvement through training programs for field guides, environmental educators, and community monitors is vital for building a self-sustaining conservation framework. Promoting awareness of ethical tourism and potential industrial threats will further empower communities to act as custodians of the lake.
d. Policy and advocacy efforts – Continued engagement with local, national, and international stakeholders is required to mitigate threats such as the re-emerged proposed soda ash mining and unregulated tourism. Project findings should be used to inform decision-making and promote the legal and ecological protection of Lake Natron.
e. Securing long-term funding – Applying for additional grants and seeking support from conservation organizations, such as the Flamingo Specialist Group, will enable the continuation of research, monitoring, and community programs beyond the initial project period.

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

Yes. The Rufford Foundation logo was consistently used on materials produced – posters, village presentation and scientific conference presentations, in relation to this project. It was displayed during presentations and outreach activities at both local and international levels, including village meetings with local communities around Lake Natron. The Foundation also received international visibility through presentations delivered at COP15 of the Ramsar Convention on Wetlands in Victoria Falls, Zimbabwe, and at the 4th International Flamingo Symposium, Italy. These platforms provided valuable opportunities to acknowledge Rufford's support while highlighting the conservation importance of Lake Natron and the outcomes of the project.

9. Provide a full list of all the members of your team and their role in the project.

a) **Akshita Rabdiya** – Project Officer, responsible for project coordination, field surveys, data collection, and reporting.
b) **Dr. Jasson John** – Project Investigator, provided overall scientific guidance and support in study design and methodology.
c) **Dr. Mohammad Kibaja** – Data Investigator, responsible for data oversight, analysis support, and technical review.
d) **Macho** – Local Maasai community member and Research Assistant, supported field surveys, navigation, and trapping activities using local ecological knowledge.
e) **Olchulunoti Leiner** – Tour guide and key community supporter from Engare Sero village, actively involved in flamingo trapping and the tagging of two Lesser Flamingos.
f) **Shiro** – Motorcycle driver and short-term Research Assistant, supported logistics, transport, and field operations during surveys.
g) **Tanzania Wildlife Authority (TAWA) officials**, Lake Natron gate – Provided logistical support, facilitated smooth entry and exit, and ensured safe movement around Lake Natron during surveys.
h) **COSTECH and TAWIRI** – Acknowledged for granting the necessary research permits required to conduct this study.

10. Any other comments?

We aim to continue and expand our monitoring work at Lake Natron and are currently seeking additional funding to support this next phase. The proposed re-emergence of the soda ash plant at Lake Natron highlights the urgent need for more robust, long-term ecological data. In particular, we plan to extend our surveys beyond the eastern and southern shores to also include the northern and western sections of the lake, which remain largely unmonitored but are likely important flamingo use areas.

Lesser Flamingo breeding activity at Lake Natron is strongly influenced by rainfall patterns and resulting water levels. In 2023 and 2024, unusually heavy rainfall across Kenya and Tanzania led to elevated water levels at Lake Natron, limiting the availability of suitable shallow breeding habitats. In contrast, 2025 experienced minimal rainfall, and the lake receded rapidly, creating extensive shoreline and exposed breeding areas. During late

December 2025, we recorded approximately 5,000 breeding pairs of Lesser Flamingos — a substantial increase compared to previous seasons.

These dynamic hydrological conditions underline the importance of continued monitoring to better understand population fluctuations, breeding success, and habitat use for both Lesser and Greater Flamingos. Encouragingly, our recent datasets have already contributed valuable evidence supporting conservation efforts, particularly in informing actions aimed at halting the proposed soda ash plant development.

Photo 10: Tour Guide Training at Engare sero village, Lake Natron, Northern Tanzania

Photo 11: School awareness Program at Engare Sero primary school, Lake Natron, Tanzania in collaboration with Lessons in Conservation Organisation and Nature Tanzania

[Intentionally removed]

Photo 12: Outdoor field lessons for Enagre Sero Primary school studnets, Lake Natron, Tanzania

[Intentionally removed]

ANNEX – Financial Report

[Intentionally removed]