TERMS OF REFERENCE

For a consultant to undertake:
Mapping and analysis of land use/cover changes and fragmentation in the 'Land for Life' transboundary project area in southern Kenya and northern Tanzania (Natron-Magadi-Loita) and related impacts on natural habitats.

September 2024

1.   CONTEXT

Covering approximately 160,194 km², the Southern Kenya Northern Tanzania (SOKNOT) transboundary landscape includes eight protected areas, 32 community conservation areas and a diversity of iconic species such as 30,000+ elephants, 380 black rhinos, and the annual wildebeest migration (c 1.5 million antelopes moving across the Serengeti-Mara sub-landscape). It is home to world-renowned UNESCO World Heritage sites (Serengeti, Mt. Kilimanjaro, Ngorongoro), Ramsar wetlands (Lake Natron), and critical water sources like the Mau Forest Complex, Kenya's largest water tower.

However, this landscape faces multiple threats, including habitat fragmentation, unsustainable land use, infrastructure development, high human population growth, poaching, illegal wildlife trade and the impacts of climate change. These challenges risk undermining the resilience of natural habitats and wildlife populations, along with the livelihoods of the communities (both rural and urban) that depend on them.

To address these threats, the Worldwide Fund for Nature (WWF) is implementing (with partners) a Southern Kenya-Northern Tanzania (SOKNOT-UNGANISHA) transboundary landscape programme, with a focus on securing the ecological integrity and connectivity of the landscape, and safeguarding ecosystem services as a foundation for sustainable livelihoods and improved wellbeing for people living in this landscape.

<u>The Land for Life project</u>

Within this wider SOKNOT programme, 'Land for Life' is an ambitious 3-year transboundary project funded by the UK government (FCDO UK Aid Match) and WWF-UK, which aims to improve the wellbeing of local people whilst conserving wildlife and habitats in critical wildlife movement corridors in southern Kenya and northern Tanzania for the benefit of all (see map below). WWF-Kenya, WWF-Tanzania, Southern Rift Association of Landowners [SORALO, Kenya) and Tanzania People and Wildlife (TPW) are working in partnership with, and supporting, local communities to manage their natural resources sustainably, as well as improving their livelihoods and ability to coexist and thrive alongside wildlife including lions and elephants.
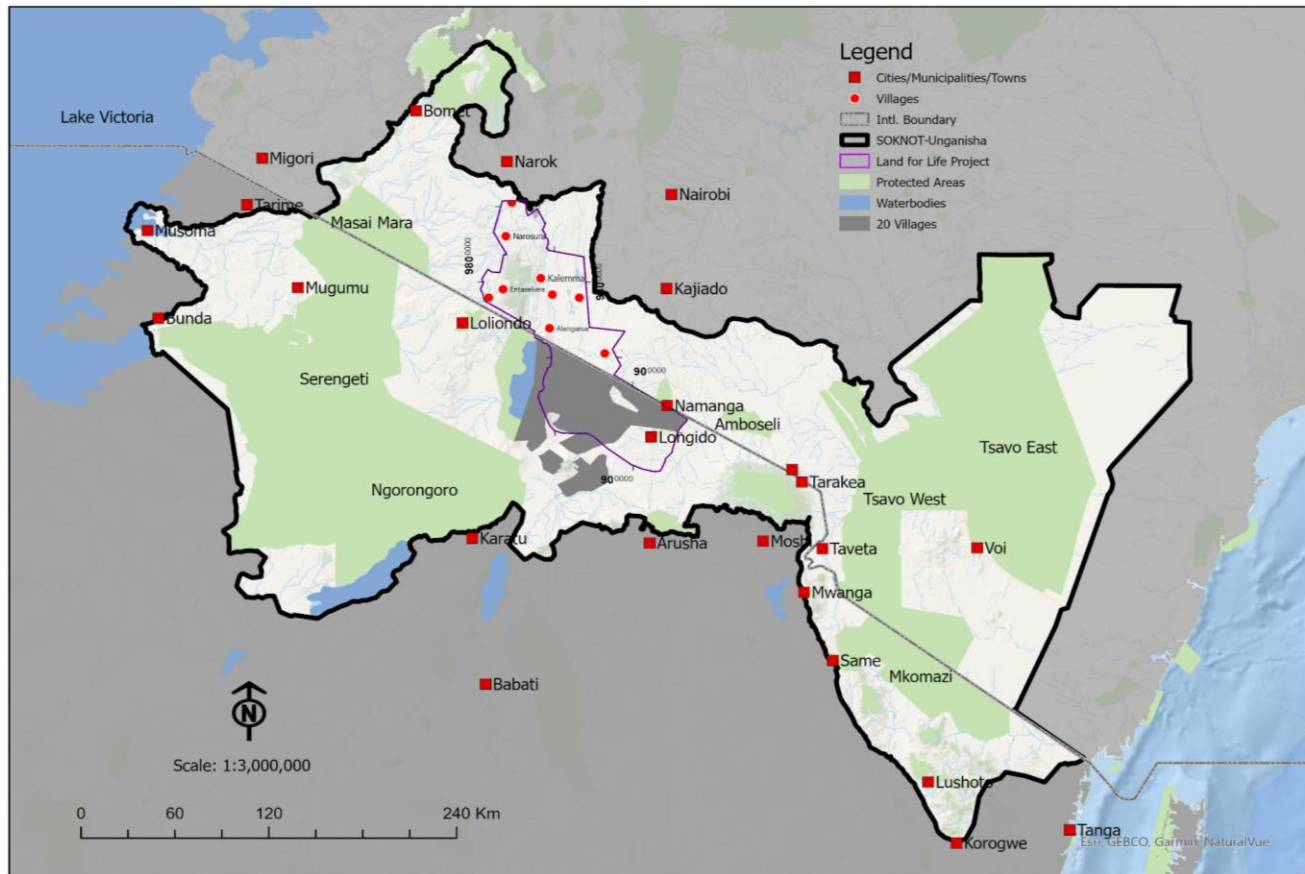
Figure 1: Map showing the location of Land for Life geoscope (8,868 km2) within the larger Southern Kenya Northern Tanzania (SOKNOT) landscape which covers approximately 160,194 km2.

In this region, the productivity and resilience of pastoral communities are linked to the ecological and functional benefits of scale, heterogeneity and land health, which if sustained, make space for large free-ranging wildlife populations and biodiversity (Western et al. 2020). But the resources for both free ranging wildlife and pastoralists are highly variable in space and time and require connected landscapes at scale (Tyrrell, 2022). However, ongoing fragmentation of (semi)natural vegetation largely by anthropogenic influence like smallholder fencing and expansion of agriculture, linear infrastructure and unplanned human settlements threatens this social-ecological system.

Spatial data on land cover as well as (the outlined) fragmentation variables are therefore useful to quantify the rate of change within a landscape, and for informing conservation and livestock management, and for local and governmental spatial planning.

In year 1 (Y1) of this project (March, 2022), a consultancy was undertaken in Tanzania to map baseline data on fencing, human settlements, agriculture and water sources; and also to gather data on human wildlife conflict and wildlife populations. For Kenya, there is an open access Landscape Dynamics (landDX) spatial-temporal database, covering ~30,000 km2 of southern Kenya, with data on livestock enclosures, fencing and agricultural land incorporated.

2.   OBJECTIVE

The primary objective of this consultancy is to map and understand land cover/use changes and changes in outlined fragmentation variables across the "Land for Life" geographic scope.

Specifically, towards the end of Y3 (March, 2025) of the project, we require mapping and a comparative analysis of the observable changes between Y1 and Y3 to provide insights into the project's impact on habitat quality and fragmentation status.

3.   TASKS AND RESPONSIBILITIES

The consultant is responsible for mapping, analysis and reporting of changes in land cover/use and fragmentation as outlined in 3 i) and 3 ii) (below) across the entire Land for Life geographic scope. It is envisaged that the consultant will take stock and integrate already existing data through initiatives to map-out such features in the geographic scope both from within WWF's programing (e.g Land for Life project) and from other external/partner efforts such as Landscape Dynamics (landDX) (see Reference section). Specifically, the consultant's responsibilities encompass:

i) Mapping the extent of land cover/use changes:

The mapping and change analysis on land cover/use should cover the entire geographic scope. The analysis should consist of two epochs: 2020 - 2021 as baseline and 2024 - 2025 as current state. It is highly recommended that 10m resolution open access satellite imagery (sentinel 2) is used in this study. Land cover/use classes should adopt the FAO land cover classification system (LCCS) adaptable to the Land for Life region. Long term land cover change analysis covering the 5 year period should clearly indicate class transitions and an explanation of these changes should relate to observable changes in fragmentation variables assessment.

Expected outputs:

- Land cover/use maps (Yr1 2020 and Yr3 2024),
- Land cover/use change maps (Yr1 2020 - Yr3 2024),
- Related change assessment and statistics report covering key habitats.

ii) Mapping the extent of change in land fragmentation variables:

The mapping and analysis provided must be detailed enough across the geographic scope in order to provide insights into the extent of fragmentation in the Land for Life project region. It is therefore envisioned that the consultant will use freely and publicly available moderate to high resolution satellite data e.g. on Google Earth among other possible options. Specifically, the following variables will be mapped and change in their extents assessed over the 2 epochs (Yr1 2020 - 2021 and Yr3 2024-2025):

- Fences (polyline features): Visible fence-lines surrounding *shambas*, houses, or demarcations of plots or grazing areas. Including two main types: "brush" fences and wire fences. **Note**: Brush fences are easily distinguishable as they are much wider than other types of fences, and are dark brown in color. Satellite imagery is not accurate enough to identify the thin, wire fences common to agricultural land; however, an abrupt change in land use, especially if it is in a straight line, indicates a wire fence.
- Other linear features: such as visible roads and powerlines.
- Livestock enclosures (bomas): Visible *bomas* which are active or recently active.

- <u>Human settlements</u> (polygon features): Visible *settlements differentiated by type e.g manyattas, market center etc.* Unlike the fence's shapefile, there is no category for type, as all bomas have a brush fence. It is also a polygon shapefile as opposed to the fences shapefile, which is a polyline.
- <u>Water sources</u> (Point features), differentiated by type e.g water pans, shallow wells, sand dams, springs, boreholes and by use e.g. livestock, wildlife, domestic.
- <u>Agriculture expansion</u> areas (polygon features) distinguished as either arable and irrigated.
- <u>Invasive species coverage</u> (polygon features).
- <u>Artisanal mining sites</u> including quarries (polygon features).

Expected outputs:

- Geographic data / vector layers (shapefiles) and maps for each specified fragmentation feature listed above each covering the project start Yr1 2020 and the current Yr3 2024 periods.
- Change report encompassing all the listed features above, related change statistics and maps showing fragmentation hotspots.

iii) Comprehensive Geo-database on mapped features:

The consultant is expected to organise all the geographic layers derived from the analysis in step (i & ii) above into a project file geodatabase. The geodatabase should consist of three (3) feature datasets namely:
   ➔ baselayers - consisting of ancillary layers on the project area
   ➔ land cover/use - consisting of outputs from land cover/use assessment
   ➔ fragmentation - consisting of mapped data/assessment of fragmentation variables

Upon completion, the geodata would be published on <u>WWF Africa GIS platform (CoE)</u> and made open source for all conservation groups to use.

Expected outputs:

- A project file geodatabase.

4.   DELIVERABLES

❖ Inception report, including detailed methodology.

❖ Presentation of a first draft report to the WWF team and Land for Life partner experts, including results of mapping land cover/use and fragmentation variables.

❖ All datasets collected and analyzed as well as maps as outlined in sections 3 i) and ii) in appropriate formats and a Project File geodatabase handed to WWF GIS team and project partners.

❖ Final report on results of Mapping and Analysis of Land cover/use changes and Fragmentation (human settlements, fences, water points, agriculture and mining) and related impacts on natural habitats for the 'Land for Life' project.

5.   QUALIFICATION PROFILE

- ▪ Experience with QGIS, ArcGIS, R/RStudio, remote mapping and digitisation;
- ▪ It is strongly preferred if the applicants have teams/individuals from both Kenya and Tanzania;
- ▪ References to successful completion of similar assignments;
- ▪ Experience of working with Government authorities and NGOs particularly in Northern Tanzania/Southern Kenya landscape would be an added advantage;
- ▪ Experience with WWF-related planning procedures would be an added advantage;
- ▪ Ability to maintain effective working relations with stakeholders;
- ▪ Fluency and excellent writing skills in English language.

6.   CONTRACT PERIOD

It is envisioned that the assignment will take approximately 45 days (potentially spread over a number of months).

The contract must be completed by the end of March 2025, earlier is preferable.

7.   APPLICATIONS

Applications should include a proposal of work, methods, timeline, relevant qualifications and experience, CVs of core team, budget, and 2 references, to be submitted by email by midnight on the 6th October 2024 to jcousins@wwf.org.uk

All proposals will be evaluated on total cost and service levels which provide optimal benefit to WWF-UK.

The following criteria will be used for evaluation:

1. **Financial and Terms Proposal 45%** (Total cost of the proposal, Contractual terms)
2. **Services Proposal 45%** (Alignment between WWF-UK requirement and the vendor's capacity)
3. **Company Profile and Values including sustainability approach 10%** (Evidence that the vendor is proactively reducing their impact on the planet).

8.   CONTRACTING WITH WWF-UK

It is our requirement that an appointed external partner adopts our standard terms and conditions for engaging with us. These are included within the tender documents. *Please confirm you are willing to accept these terms. Should you have any amends you wish to make, these will need to be discussed with the WWF-UK legal team.*

WWF-UK asks all suppliers to comply with the Supplier Code of Conduct and WWF-UK 3rd Party Expenses Policy. Both documents are enclosed within the tender pack. *Please confirm your acceptance of both.*

All contracted suppliers are required to register on Panda Purchasing (WWF-UK's PO and invoice system). *Should you be successful in your bid, please confirm you will be willing to register on the system.*

9. REFERENCES

Tyrrell et al. 2022. Landscape Dynamics (landDX) an open-access spatial -temporal database for the Kenya-Tanzania borderlands. Nature. Scientific Data 9 (article number 8). Landscape Dynamics (landDX) an open-access spatial-temporal database for the Kenya-Tanzania borderlands | Scientific Data (nature.com)

Western et al. 2020. Conservation from the inside-out: winning space and a place for wildlife in working landscapes. People and Nature 2020;2:279-291. Conservation from the inside-out: Winning space and a place for wildlife in working landscapes - Western - 2020 - People and Nature - Wiley Online Library

WWF. 2022. Mapping of Natural Capital and Connectivity in the Lake Natron Area. (Consultancy report, available on request).