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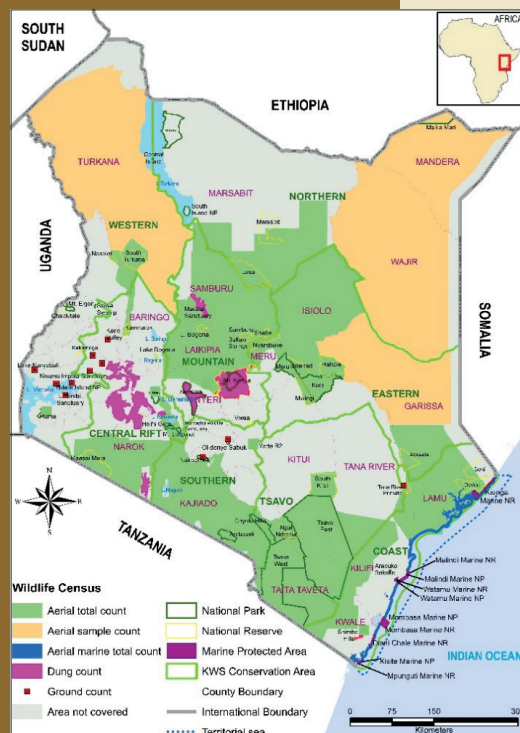
Wildlife Census and Habitats Monitoring for Enhanced Sustainable Management of Kenya's Natural Resources

BACKGROUND:

The Ministry of Tourism and Wildlife (MoT&W), Kenya Wildlife Service (KWS) and the Wildlife Research and Training Institute (WRTI) are mandated to gather and provide information to facilitate the development of critical reports, such as, the 'Wildlife Conservation Status Report' and the 'Wildlife Resources Monitoring Report' to be presented to Parliament for policy direction. The institutions are currently undertaking the second national wildlife census for the financial year 2024-2025. The main objective is to update the National Database of wildlife species and the impact of habitats on wildlife and their distribution.

The last National Wildlife Census was carried out in the year 2021 where over 30 species of mammals, birds and marine species were counted in various ecosystems during the census. The census involves the use of aircraft (fixed-winged and helicopters), vehicles, dictaphones, cameras, Geographic Information Systems (GIS) and Remote Sensing for recording and analysis of data.

In the year 2022, the country experienced severe drought affecting natural habitats productivity leading to massive wildlife and livestock deaths, and increased cases of human wildlife conflicts such as livestock predation and wildlife



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killings emanating from retaliatory attacks. The ongoing census is critical in establishing the status of wildlife numbers and the droughts impact on habitats which not only support wildlife conservation, but also communities' livelihoods directly and indirectly.

It is in this regard that ICPAC–GMES&Africa in support to WRTI endeavors to provide a service on the state of natural habitats through routine assessment and tools in IGAD Protected Areas (PA), to support conservation policies and sustainable management of PA. The service seeks to continuously monitor and assess the state of natural habitats at various levels to support decision making process.

USERS PROFILE:

WRTI's strategic goal is *"provision of leadership and coordination in wildlife research and provision of scientific data and information"*. Status of wildlife protected areas, wildlife and their distribution are of National and International interest. As a research institution, WRTI is promoting sustainable management of natural resources through the effective use of Earth Observation data to develop relevant operational information services with special focus on status of landscapes, ecosystems and protected areas including; land use/ land cover changes, vegetation indices as well as eco-climatic conditions that relate to habitat conditions, suitability and productivity and community livelihoods.

USER'S NEEDS:

The institution therefore promptly and proactively provides data and information to the Institute's Board, Ministry and to the National Assembly on status, current threats and opportunities facing conservation sector for policy and decision making. In this case, WRTI is using Earth Observation data to highlight the status of protected areas, wildlife trends, advice on carrying capacities and respective management measures to ensure sustainability of these critical species and habitats for posterity.

INFORMATION PROVIDED:

In provision of status of protected/ ecosystem/ landscape areas, Sentinel1 and Sentinel 2 data were analyzed to provide habitats conditions through land use/ cover maps as well as Normalized Difference Vegetation Index (NDVI) as shown in Figure 1. Other products developed and utilized include; precipitation (RFE including their Anomalies), Temperature, NDVI Anomalies and primary productivity (Dry Matter Productivity). These products provide information for upward or downward wildlife numbers and their distribution within ecosystems where Total Aerial counts have been carried out. Validation of these products has been done using both field work and conducting a time series analysis to ascertain the impact



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of drought to the ecosystem through the eStation. The eStation is a robust tool for Earth Observation and climate data acquisition, processing and analysis system developed by the Joint Research Centre of the European Commission. For sustainability, ICPAC has effectively trained WRTI field scientists on generating these products through the eStation and other tools, at the same time more products can be accessed through the ICPAC GMES&Africa, via the data hub (<https://gmes.icpac.net/data-center>) , geoportal (<https://geoportal.icpac.net>), eStation (<http://estation.gmes.icpac.net/>) and website (<https://gmes.icpac.net>), in pdf, jpg, png, geotiff, shp and csv data formats.

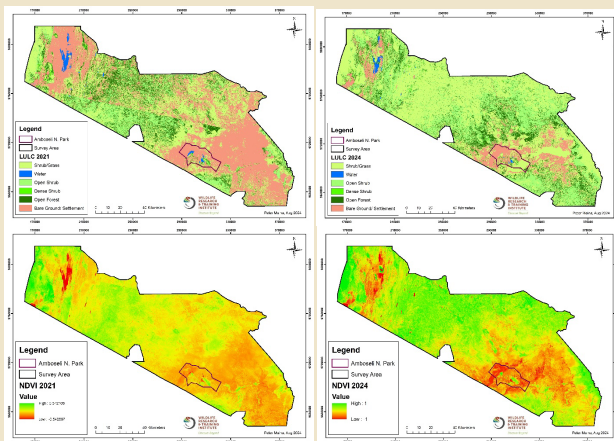


Figure 1: LULC and NDVI changes for Amboseli- Magadi census block 2024

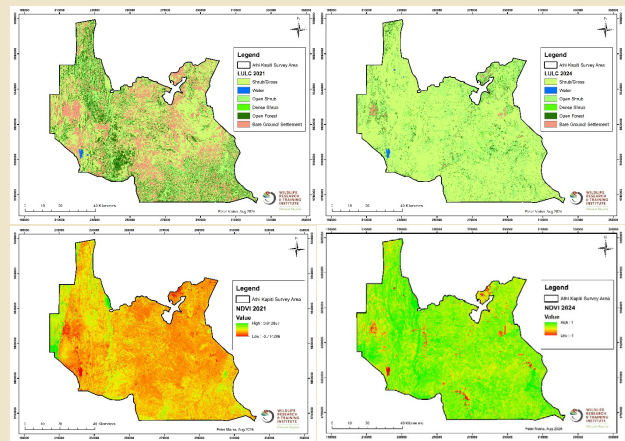
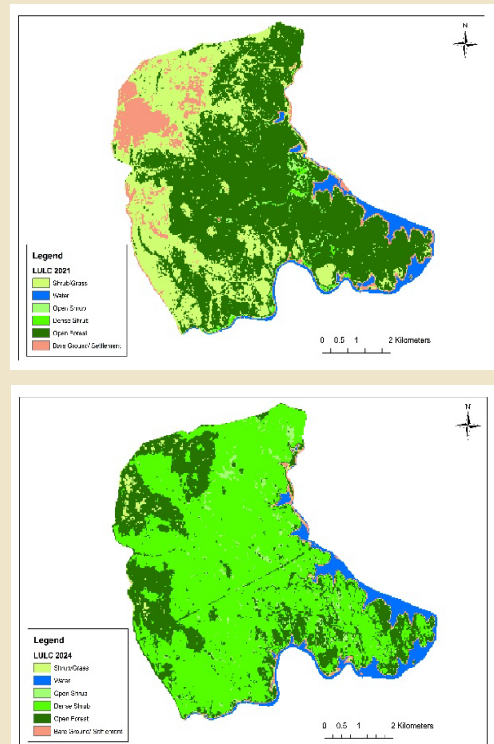


Figure 2: LULC and NDVI changes for Athi-Kapiti census block 2

USAGE:

WRTI observed a significant elephant population within Mwea National Reserve, prompting immediate conservation action. Vegetation map from land use/land cover analysis indicated a sharp decline in open forest from 2021-2024 despite a lower elephant count compared to 2021 census. This necessitated an increase in search distance for other herd/s outside the reserve. Interestingly, a herd of approximately 40 elephants were located far from the reserve. In response, WRTI recommended translocation of some elephants out of the reserve to a larger ecosystem (Aberdare).

Figure 3: LULC showing immense changes in vegetation structure due to elephants carrying capacity being exceeded



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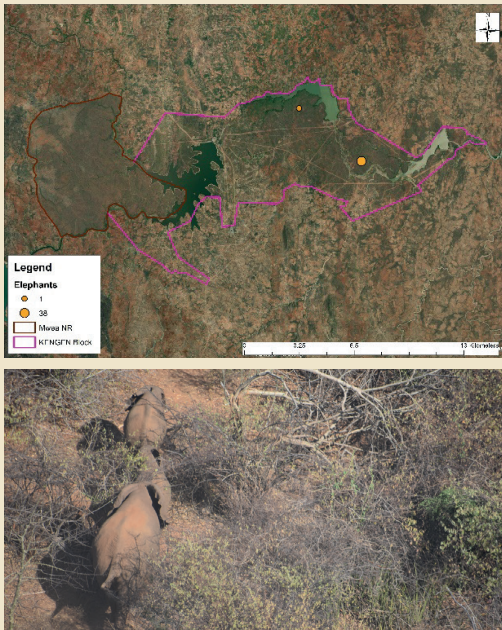


Figure 4:
a) LocaAon of large elephant herds outside protected area; b) Aerial photo of the herds



Figure 5: Elephants being loaded to a truck for translocation

Tourism and Wildlife, Conservancies, Kenya Forest Service, Directorate of Resource Surveys and Remote Sensing –DRSRS) in improving services and products. Various media channels have been adopted to further the engagements, in addition to emails, workshops and conferences on various products and services. This has increased the confidence in utilization of Earth Observation for Natural Habitat Monitoring.

Figure 6: User engagement and dissemination workshop (Presentation of Invasive species mapping findings at NACOSTI, 2nd Multisectoral Conference on Science, Technology and Innovation, May 2023)



IMPACT:

ICPAC and WRTI collaboration in Natural Habitat Conservation, Forests and Rangelands monitoring has enhanced the institute's capacity in timely delivery of services and products for policy and decision making. Specifically, most fields and scientists at the headquarters are able to access Earth Observation data and develop protected-area specific products for ecological monitoring purposes. Through onsite and online training, ICPAC has promoted capacity building of WRTI scientists in access and analysis of geospatial data especially on the applications of IMPACT Tool, eStation, Qgis and others. The land use/ land cover and eco-climatic conditions analysis for ecosystems has added value in understanding wildlife distribution in respect to habitats status and productivity. This information has also been used in identification of wildlife migration corridors and routes as well as assessing their viability. The link (<https://www.tourism.go.ke/landmark-elephant-translocation-mwea-reserve-to-aberdare-national-park-14-10-2024/>) provides more information on the impact.

OUTREACH:

WRTI continuously engages end users both internal (staff) and external (Kenya Wildlife Service, Ministry of



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