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ABSTRACTS

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Behaviour and the impact of climate change on birds

S.J. Cunningham

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One of the greatest current threats to biodiversity is climate change. Animals' responses to this threat are shaped by mechanistic links between climate, performance, and fitness. I will present data on avian responses to high temperatures drawn from ~15 years of research on a diverse range of bird species in Southern Africa, collected by the Hot Birds Research Project (HBRP) team. The HBRP is based at the FitzPatrick Institute of African Ornithology at the University of Cape Town and at the University of Pretoria, with strong collaborations internationally. Our work focuses on the behavioural and physiological mechanisms by which birds are vulnerable or resilient to climate change. I will describe some of our key findings on how behaviour mediates the relationship between thermal physiology and the thermal environment, with the potential to both buffer and exacerbate climate risk. I will include new data on how habitat structure, resource availability, and sociality can modify impacts of hot weather on behaviour and fitness outcomes, and show preliminary results from pilot studies of practical conservation interventions. Our results highlight that data on animal behaviour can be used to aid conservation decision-making and suggest that behavioural responses to our warming climate might shape the functioning of future ecosystems.

Reimagining the South African Museum: Beyond the 200-year-old Wunderkammer

W. Florence

Iziko Museums of South Africa, Iziko South African Museum, 25 Queen Victoria street, Cape Town, 8000, South Africa.

The Iziko South African Museum (ISAM), established in 1825, is the oldest and most significant museum in southern Africa, with a rich legacy of scientific research, particularly in zoological sciences. Throughout its history, it has been a leading institution in advancing our understanding of natural history and biodiversity, contributing to key fields such as zoology, palaeontology, and ecology. However, the museum's past is also tainted by colonial practices of unethical collection and exhibition. In its bicentenary year, the museum is seizing the opportunity to redefine its role in science and society. Through the implementation of inclusive, decolonised storytelling and collaborative curatorial practices, Iziko is embracing its responsibility to foster social transformation and raise awareness about pressing environmental issues. By revisiting its extensive collections with fresh perspectives and integrating cutting-edge technologies, the museum seeks to promote African-centred narratives, support scientific advancement, and engage the public in critical conversations about conservation and biodiversity. In doing so, Iziko South African Museum is not only preserving the natural heritage of the continent but also shaping a more inclusive and dynamic future for both science and society.

Lessons from our thunderbird: the Southern Ground-hornbill

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The Southern Ground-Hornbill (*Bucorvus leadbeateri*) is a highly intelligent and socially complex species facing significant conservation challenges. The Mabula Ground Hornbill Project has pioneered efforts to safeguard this species, deepening our understanding of its ecology and the landscapes it inhabits. Intensive management of reintroduction stock has provided crucial insights into key health threats, such as Newcastle Disease Virus and lead toxicosis, as well as social structures, confirming that second females are rarely tolerated. Expanding data collection beyond traditional bird atlas contributors has nearly doubled the estimated population size and led to the discovery of additional nesting sites. This has allowed for the wider implementation of Custodianship programs, strengthening habitat protection. A key lesson from our work is that simple, accessible technology can significantly enhance conservation efforts. By engaging broader communities through citizen science, we have increased public participation and improved monitoring efforts, demonstrating that conservation is most effective when it is more inclusive. I will discuss the successes, challenges, and innovative approaches that have shaped our efforts, reinforcing the critical role of partnerships in ensuring the future of this iconic species, especially for widespread and high-impact threats such as lead toxicosis.

Managing Complexity of Biodiversity: The Challenge of Balancing Detail and Simplicity in Conservation

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Ecological monitoring facilitates efficient evaluation of biodiversity and conservation states. Monitoring designs, objectives, and key questions allow us to address questions around functionality and interlinkage. However, modern conservation practices are no longer limited to biodiversity and carry economic, social, ecological, and climatic aspects. Maintaining various facets of biodiversity is a key feature to achieving conservation objectives; the loss of which could consequently lead to risk. Conservation practitioners at the interface between science and conservation use robust biodiversity monitoring to address various aspects of conservation, ranging from species and community composition to ecosystems and landscapes. These are applicable to terrestrial, freshwater, and marine habitats. Biodiversity measures that are repeatable over time can produce analysis of trends and generate predictive models can assist with producing insights into the future outcomes of biodiversity conservation. Identification of the biodiversity indicators are key to the application and interpretation of efficient conservation. Although the complexities of modern conservation exist, focused interlinked monitoring designs of biodiversity components can efficiently evaluate conservation objectives.

Osteohistological Insights into the growth dynamics of living Crocodylia: foundations for paleobiological inference in this lineage

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The Crocodylia is a clade of Neosuchia Crocodyliformes, currently represented by 26 species across three families —Alligatoroidea, Crocodyloidea, and Gavialoidea— that inhabit freshwater, estuarine, and marine environments in tropical and subtropical regions of the world. Interestingly, the fossil record of Crocodylia reveals a much greater taxonomic, morphological, and ecological diversity, with a notable peak during the late Miocene. The rich evolutionary history and diversification of Crocodylia permits an exploration of growth strategies and developmental mechanisms that can be assessed through the use of osteohistology which offers critical insights into key life history data such as longevity, growth dynamics, and skeletal maturation. Here, we present our study of the bone microstructure of the postcranial bones of the American broad-snouted caiman (*Caiman latirostris*, Daudin, 1802; adult body size less than 3m) and the South African Nile crocodile (*Crocodylus niloticus*, Laurenti, 1768; adult body less than 5m). Our results show that both species have similar bone microstructure, including bone tissue types and the preservation of remnants of embryonic bone. Also, comparable intra- and interskeletal variation was observed. Remarkably both cyclical and non-cyclical growth marks were observed in the juvenile stages of both species, probably related to different external stressors. Overall, our study demonstrates similarities in the growth dynamic of these species and thereby expands our understanding of the osteohistology of extant crocodilians. This study provides an important foundation for analysing the palaeobiology of extinct Crocodylia with diverse body sizes.

Protecting our hidden biodiversity: the why, how and where to for parasite conservation.

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Global biodiversity has been in decline for several decades, marked by species extinctions and population losses that have cascading negative impacts on ecosystems. Despite the growing list of described species, much of the actual threatened biodiversity remains unknown, particularly among invertebrates, including those with a parasitic mode of life. Parasites, the hidden diversity, which outnumber free-living species and constitute a significant proportion of ecosystem biomass, remain largely neglected in conservation efforts. The extinction of free-living host species often lead to co-extinction events, where parasite species may face extinction even prior to their host species. This presentation highlights "why" we need to incorporate parasites into broader conservation agendas and management plans and practices. It provides an overview of the evolution of species conservation from a focus solely on free-living species to one that includes symbiont assemblages. However, the "how" is more complicated as several obstacles continue to hinder the inclusion of any parasitic species in conservation and these will be discussed in detail. Furthermore, two case studies from our recent work on aquatic parasite conservation will be presented to help addressing the "how". The first focus on the parasites of threatened freshwater fish species of the South African Cape Fold freshwater ecoregion and the second look at the role of marine protected areas in the conservation of fish parasite diversity. In conclusion, the presentation outlines future research directions, "the where to", to better understand and conserve parasites of wildlife, advocating for their inclusion in biodiversity monitoring programs and conservation agendas.

Abstracts Oral Presentations

Evaluating the latitudinal differences in eel recruitment in three estuaries along the coast of KwaZulu-Natal Province, South Africa

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Globally many eel species have declined because of numerous factors, with harvesting and exploitation of the species primary reasons. As long-distance migratory species, African freshwater eels (*Anguilla* spp.) are important and unique ecological indicators with increasing concern around their conservation status. These eels are catadromous species and are important indicators of aquatic connectivity. A great deal of knowledge gaps exists concerning the Anguillid eels. For the present study, we assessed the latitudinal differences in Anguillid eel recruitment between three selected estuaries along the southeast coast of South Africa, and which factors may be influencing their recruitment. We predicted that a multitude of factors may influence recruitment, such as a degree of connectivity, the availability of suitable habitat and water quality to mention a few. Monthly sampling was conducted from October 2024 – May 2025. Our preliminary findings showed that the connectivity between the marine and estuarine environments during the wet season strongly aids Anguillid eel recruitment. The outcomes of this study will provide valuable information which may improve our understanding of eel recruitment of four globally important eels.

The effects of localised habitat degradation in the Kalahari on the physiology and behaviour of white-browed sparrow-weavers (*Plocepasser mahali*)

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Piospheres are concentric rings of degradation that form around a central point, such as a water source, specifically in arid environments. This results in increased herbivore presence, which impacts the vegetation and soil. Although these landscape features have been studied from a pastoral perspective since the early 1950s, there is a paucity of data on the ecosystem implications. We hypothesise that piospheres limit food availability to birds that are restricted to small home ranges and greatly reduce the availability of crucial microsites. We studied white-browed sparrow-weavers (*Plocepasser mahali)* at Tswalu Kalahari Reserve to determine the effects of piospheres on both their physiology and behaviour. We determined how foraging behaviour, body condition, body temperature, microsite use, and thermoregulatory behaviour from focal observations conducted at the heat of the day, vary as a result of piosphere presence. Additionally, we experimentally controlled surface water availability to account for the provision of water (intended for large game) in degraded piospheres. Preliminary data suggest that birds within piospheres show reduced body condition, spend more time perched in shaded microsites and less time foraging, and show elevated body temperature during the heat of the day, than birds outside piospheres. These findings are likely explained by the severe reduction in plant cover and food availability within piospheres, leading to reduced foraging opportunities, foraging success, and increasing heat exposure. These findings provide empirical evidence that desertification can disrupt energy balance in arid-zone birds and may compound the effects of climate change in arid areas.

Behavioural responses of Cape fur seals *Arctocephalus pusillus* to swimming with seal tourism activities in the Robberg Marine Protected Area in South Africa

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Behavioural changes are often regarded as a key indicator of how human disturbances affect animals, and these responses are commonly used as an index of the impact of such disturbances. Tourism is an increasingly common source of disturbance to wild animals, including marine mammals. A relatively new form of tourism targeting marine mammals is swimming with seals (SWS), an industry that has recently grown in countries such as New Zealand, Australia and South Africa. We studied the behavioural impacts of SWS in the Robberg Marine Protected Area (Western Cape, South Africa) on the adjacent Cape fur seal *Arctocephalus pusillus pusillus* colony. This was conducted through a modified Before-After-Control-Impact (BACI) behavioural study designed for simultaneous observations of Impact and Control areas (site factor), Before, During and After SWS activities (phase factor). Observations were carried out from an elevation at distances from the Impact sites that precluded observer impacts, with sequential photography of the colony providing the basis for enumerating seals in different behavioural categories and comparing these between sites and between phases, as well as interactive effects of site and phase. It was clear that SWS activity and associated boat approaches brought about certain behavioural responses in the colony, however only a small proportion of animals in the Impact site that were affected (≤ 2%) and no extreme reaction (i.e. stampedes) was observed. Models showed that operational (group size of swimmers, distance of swimmers and boat from colony, and environmental factors (air or sea temperature) influenced certain seal behavioural responses.

Trapped: the genomic consequences of urbanization for Cape Town's caracal

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Globally, wildlife populations are increasingly impacted by urban development, but across the world's cities, species are adapting in surprising ways. Through the Urban Caracal Project, we use a multi-disciplinary approach to understand how urbanization impacts wildlife. Despite disrupting ecological connectivity, how the expansion of the world's cities influences the population genomic diversity of urban wildlife remains largely unexplored. Here we examine the genomic consequences of urbanization in Cape Town's caracal population by exploring the relationship between gene flow and population viability in these urban-adapting wild cats. While analysis of GPS collar data reveals modified spatial and behavioural ecologies by caracal that suggest a degree of local adaptation to the evolutionarily novel challenges of city living, comparative whole-genome data reveal rapid population divergence and elevated inbreeding via reduced migration rates over the past 50-75 years. Additionally, eco-evolutionary simulations project substantial population decline under current levels of connectivity, with greatly elevated extinction risk under scenarios of reduced migration and increased anthropogenic mortality. While our project research findings have revealed the high behavioural flexibility of caracals adapting to a rapidly transforming cityscape, extensive urban development with negligible attention to ensuring connectivity for all the city's wildlife leaves Cape Town's rich biodiversity vulnerable to the highly adverse effects of ecological isolation.

Advancing bryozoan identification: First application of mass spectrometry in Electra pilosa (Linnaeus, 1761) analysis from the North Sea

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Electra pilosa (Linnaeus, 1761) is a colonial bryozoan and a cosmopolitan species with considerable morphological variation, as seen in many bryozoans, making traditional identification methods often insufficient. In this study, we analysed *E. pilosa* specimens from the North Sea using DNA barcoding, Scanning Electron Microscopy (SEM), and Matrix-Assisted Laser Desorption/Ionization (MALDI) mass spectrometry. Of the 18 samples identified as *E. pilosa*, ten were barcoded and confirmed as *E. pilosa*. MALDI results aligned with genetic findings, demonstrating its potential as a complementary identification tool. As the only species successfully identified using all three techniques, *E. pilosa* serves as a model for refining taxonomic approaches. Establishing a baseline with these methods enhances species identification, particularly for distinguishing native, cosmopolitan, and invasive populations.

Assessing South Africa's Abalone Resource: Updating the Stock Assessment Amid Challenges

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Haliotis midae, commonly known as abalone or 'perlemoen', is a slow-growing marine gastropod endemic to South Africa. It is highly valued in seafood markets, maturing at seven years and reaching legal harvesting size (~11.4 cm shell breadth) only after 8–9 years. Densely populated in shallow coastal waters (<5 m), abalone are distributed from St Helena Bay to just north of Port St Johns. Historically, the most productive areas lay between Cape Columbine and Quoin Point. However, illegal harvesting, ecological disruptions, and inadequate data have severely impacted this resource. This stock assessment update highlights the considerable data gaps since 2017, particularly the absence of fishery-independent abalone surveys (FIAS) due to administrative and capacity limitations. These surveys are critical for understanding trends in abundance and size structure and have constrained effective management. While commercial CPUE and confiscation data are available, they are subject to under-reporting and fraudulent landing slips, limiting their reliability as sole indices. Efforts in 2023 have renewed focus on data collection, with recent FIAS inputs from Zone B and F and improved poaching data expected to improve the 2025 assessment. Notably, Zones C and D remain critically depleted due to combined poaching pressure and ecosystem shifts from West Coast rock lobster incursion, which has altered juvenile abalone recruitment. Climate change and ocean acidification further threaten the long-term viability of both wild stocks and aquaculture operations. This assessment underscores the urgent need for coordinated data collection, improved compliance, and responsive management strategies to ensure the sustainability and recovery of this iconic marine species.

People's perceptions and attitudes towards owls in urban-rural mosaic landscapes of KwaZulu-Natal, South Africa

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In a changing world, effective wildlife conservation requires translating ecology into management. This emphasises the need to understand the relationships between humans and wildlife, as the survival of species such as bats, reptiles, and owls is not only influenced by environmental factors, but also cultural and social values associated with them. Ethno-scientific approaches, such as structured questionnaire use, have proven invaluable in bridging this gap. In this study, we used a mixed model approach (face-to-face interviews and online questionnaires) to investigate people's perceptions, attitudes and emotions towards owls in urban-rural mosaic landscapes of KwaZulu-Natal, South Africa. Face-to-face interviews were conducted using simple random sampling, allowing study participants to have an equal chance of being selected. Online questionnaires were distributed via Google Forms through social media platforms, allowing for a broader geographic representation in KwaZulu-Natal. We will use generalised Linear Mixed Models to analyse the data. We obtained 820 responses from people in rural and urban areas of KwaZulu-Natal. Our preliminary results show that major cultural beliefs associated with owls, often negative and leading to their persecution so, interfere with the ecosystem services they provide. Highlighting the importance of gathering insights and indispensable evidence on human perceptions of wildlife species for effective conservation.

Connecting spots in a fragmented landscape: Identifying, prioritising, and protecting potential corridors for leopards in the Western Cape

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Globally, large carnivores are declining due to anthropogenic pressures such as habitat loss, reduced prey bases, and persecution. These increasing pressures are concerning for leopards (*Panthera pardus)* in the Western Cape, which have larger territories than their savanna counterparts and occur at lower densities. Identifying and protecting wildlife corridors is vital to connect sub-populations of fauna, conserve large predators and their prey species, and ensure ecosystem and genetic integrity. Our study incorporated a leopard habitat suitability model for the Western Cape to define, identify, and prioritise potential wildlife corridors. Three of these corridors were investigated using a socio-ecological approach. The following criteria were applied to systematically identify core areas for leopards: habitat suitability of 48% or higher (Max SSS threshold), protected areas, and area sizes greater than 34.8 km^2. The habitat suitability model, exponentially inversed and reinforced with road network layers, was used in Linkage Mapper software to predict least-cost linkage pathways between core areas. Using the Linkage Priority tool, linkages were ranked by predicted conservation priority based on selected built-in criteria. Camera trap surveys and interviews conducted within the three priority corridors revealed leopard activity and potential threats to leopards. In 2025, leopard movement corridor GIS layers and an interpretive practitioner's handbook will be uploaded to a public conservation repository. These tools will be made available to inform land management and land protection decisions for leopard movement corridors in the Western Cape, contributing towards reducing threats, meeting biodiversity stewardship targets, and securing these vital corridors in perpetuity.

Investigation of the pathologies evident in a 5 million year old canid from Langebaanweg (South Africa)

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Langebaanweg is a world-famous 5–7-million-year-old locality on the West Coast of South Africa. It is renowned for its rich diversity of both terrestrial and marine vertebrate fossils. Among the several carnivorans known from this site is the recently described jackal-like canid, *Eucyon khoikhoi*. One of the four skeletons assigned to *E. khoikhoi* shows anatomical deformities on several of its skeletal elements. Here, we utilise anatomical descriptions, CT scanning and osteohistology to investigate the bony overgrowths or exostoses evident in the radius of the specimen. We make comparisons with a radius from a healthy individual of the same species, also recovered from Langebaanweg. Our findings indicate that anatomical observations are important for first-level inspection of the pathology, but that micro-CT scanning permits a 3D assessment of how the pathology affected the internal microanatomical organization of the bone, both periosteally and endosteally. The application of these multiple methodologies permitted us to diagnose the tumours as benign rather than cancerous. Furthermore, the identification of calcified cartilage in the histological thin sections in the region of the exostosis permitted the diagnosis of the exostosis as an osteochondroma. This study demonstrates the usefulness of applying multiple techniques to characterize and diagnose pathological exostoses in a fossil canivoran. Our results also indicated the usefulness of histological studies in permitting a more refined diagnosis of the exostosis as an osteochondroma.

Land-use impacts on mammals and herpetofauna in the Drakensberg Midlands of KwaZulu-Natal, South Africa

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Changes in land cover affects the amount of habitat available for many wildlife species (Cuarón 2000), with a change in land cover from natural habitat to human-dominated ones being a main cause of global loss of biodiversity (Pereira et al. 2004; Kiffner et al. 2015). The influence of land use type and microhabitat on mammalian communities in the Drakensberg Midlands of KwaZulu-Natal were investigated through occupancy modelling. We deployed 88 camera traps across 5 different land-use types, of varying sizes. We installed camera traps using a systematic grid placement of 1.5 km x 1.5 km, with the camera traps being active for 24 h for at least 21 days. At each camera trap location, habitat structure foliage profiles were recorded in a 20 m radius around the camera trap. Camera trap locations were sampled in the wet (October – March) and dry (May – September) seasons to determine the factors influencing mammalian presence. To determine the herpetofauna found across the study area, herpetofauna surveys were conducted, whereby reptile and amphibian species were noted in each study area over a 4-day period. Surveys were conducted over 5 hours/day in the winter and summer seasons. Preliminary results indicate that Nambiti Private Nature Reserve had the highest mammalian species (33), followed by Aloe Africa Hunting Safari (28) and Zingela Safari and River Company (13). Winter herpetofauna surveys indicated that Nambiti Private Game Reserve had the highest snake and lizard species richness, with Aloe Africa Hunting Safari having the second highest diversity of snake species

Effects of public roads on wildlife-vehicle collisions in Hluhluwe-iMfolozi Park and iSimangaliso Wetland Park in KwaZulu-Natal, South Africa

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Anthropogenic change is a global threat to wildlife and the biosphere's health, with wildlife facing growing threats from anthropogenic activities, especially infrastructure. Globally, studies have found that public roads in protected areas (PAs) cause large numbers of wildlife-vehicle collisions (WVCs), threatening the stability of these wildlife refugia. As vehicle traffic density is increasing globally, particularly in Africa, where little research on the ecological impact of linear infrastructure has been done, the impact of roads on wildlife in PAs must be determined. We determined the effect of public roads on vertebrate mortalities in the protected areas of Hluhluwe-iMfolozi Park (HiP) and iSimangaliso Wetland Park (ISWP), KwaZulu-Natal Province, South Africa, collected monthly from 2021 to 2023. Species composition of vertebrate mortalities, and heat maps of mortalities, combined with a suite of ecological factors, were used to identify drivers of wildlife-vehicle collisions. A total of 1606 road mortalities were recorded, with small-bodied vertebrates (< 5 kg) comprising most of the identified species. Amphibians experienced the highest number of mortalities, while birds had the highest species diversity. High mortality levels were concentrated in areas with unsloped road surfaces and increased vehicle traffic within HiP, while the surrounding habitat had a larger influence on mortalities within ISWP. Our results showed that intervention is needed along portions of the roads in both protected areas. Mitigation measures should be implemented to reduce the number of wildlife mortalities along the roads in both locations focusing on high mortality zones, with specific measures to mitigate small vertebrate road mortalities.

How much monitoring is enough? The case of the Potberg Cape Vultures

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The Cape Vulture (*Gyps coprotheres*), once listed as Endangered, was uplisted to Vulnerable in 2021. The southernmost colony of the species and the only extant colony in the Western Cape is at Potberg, on De Hoop Nature Reserve. Regular monitoring has taken place at Potberg for over 50 years. From 1996 to 2019, monitoring took place more-or-less monthly during the breeding season but from 2023, it was reduced to three times a year and the total number of birds (not just breeding pairs) was no longer counted. The impact of the change in monitoring method on estimates of key population parameters was investigated. From CapeNature's long-term vulture database, 10 years during which at least seven surveys per year had taken place were selected for comparison. Two population parameters (number of breeding pairs and number of fledglings, defined in CapeNature 2025) were calculated (a) using all available data ("full dataset") and (b) using only data collected during May, August and October ("partial dataset"), and compared using generalized linear modelling. There was a significant relationship between the full and partial datasets for both population parameters, although parameters estimates were almost always lower for the partial than the full dataset. Although detailed information on reproductive performance (e.g. stage at which breeding failure occurs) can no longer be obtained, the reduced monitoring schedule does provide useful information on overall breeding success.

Investigating Late Cretaceous Bryozoa from Needs Camp, South Africa – First study in nearly 50 years

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Fossil Bryozoa in South Africa is understudied and has received little attention, despite the country's very rich geological and fossil heritage conservation. The existing literature on bryozoan fossils in South Africa consists of just four papers, with the most recent being slightly over two decades old. The upper and lower Needs Camp quarries in the Igoda Formation, situated about 20 km northwest of East London, are of great scientific importance, necessitating that the sites be preserved for the purposes of research. The fossils found at Needs Camp include corals, foraminifera, bivalves, and other marine invertebrate taxa, and the deposits date back to the Late Cretaceous period. This study investigated bryozoan material from the Needs Camp fossil deposits lodged in the marine invertebrate collections of the Iziko South African Museum, Cape Town. The approach was a combination of traditional morphological methods and scanning electron microscopy (SEM) technology, for imaging and measurements of diagnostic features. In total, 14 species were identified from this study, of which ten were identified to genus-level. Genera reported for the first time in South Africa from this study, include *Supercytis, Onychocella, Aechmella, Ogiva, Gastropella, Chiplonkarina, Pithodella, Wilbertopora, Hoplocheilina, Tremogasterina* and *Bountyella*. Examining backlogged museum collections contributes to our understanding of species richness and community assemblages, and therefore comprehends significant geological events and paleoenvironmental conditions. Gaps in the fossil record hamper efforts to understand important geological events and paleoenvironmental conditions.

Comparing mammal monitoring methods

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Large African mammals are usually monitored using camera traps and direct observations, two methods of which we don't know the relative advantages and, especially, costs of. These need to be better understood to help protected area managers and other actors decide which method to use. In this study we compared both monitoring methods in surveying medium-to-large mammals at Mawana Game Reserve, KwaZulu Natal, South Africa. Camera trapping detected significantly more species than transect sampling, even when disregarding nocturnal captures. Species were also detected at a faster rate by camera traps, including rarer and inconspicuous species. However, transect sampling was far less costly in human and financial resources. Neither method was biased towards larger species. We concluded that despite their high initial cost, camera traps seem more suitable than human observations for mammal inventories and long-term monitoring in savanna biomes if adequate resources are available, although common species can be surveyed effectively with transect walks if the budget is a constraint. Opportunistic human observations may additionally be an effective way to complement camera trap surveys. Other factors affecting the suitability, effectiveness and cost of different methods include habitat type, target taxa, climate, local salary levels, and the risk of loss or damage to equipment. More effort should be made to test the relative advantages and costs of different methods and share results.

Urban persistence and species interactions: Diverging trends in the Peregrine Falcon and Lanner Falcon abundance across southern Africa using the Southern African Bird Atlas Project

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Citizen science has emerged as a powerful tool for engaging the public in collecting extensive ecological data, crucial for monitoring species distribution and abundance over large geographic scales and extended time periods. This study leverages data from the Southern African Bird Atlas Project (SABAP) to investigate the distribution and relative abundance of the Peregrine Falcon (*Falco peregrinus*) and Lanner Falcon *(Falco biarmicus*) across South Africa, Lesotho, and Eswatini. Both species, known for their adaptability to diverse environments, often coexist across sub-Saharan Africa, sharing similar habitat preferences and prey species. We analysed data from SABAP1 (1987–1992) to the ongoing SABAP2 (2007–2024) to detect changes in distribution patterns and abundance over time. Our results indicated a notable increase in Peregrine Falcon reporting rates, particularly in urban areas between SABAP1 and SABAP2, suggesting successful adaptation to anthropogenic landscapes. In contrast, the Lanner Falcon displayed a more varied pattern, with some regions showing declines, especially where Peregrine Falcons were more prevalent during SABAP2, potentially indicating competitive displacement mediated by urbanisation. These findings underscore the complex interplay between urbanisation, species competition, and habitat preferences in shaping these raptors' distribution and population trends. While the behavioural plasticity of the Peregrine Falcon to urban environments highlights its resilience, the mixed responses of the Lanner Falcon suggest targeted conservation strategies to mitigate the impacts of habitat fragmentation and urban encroachment. This study's use of the Southern African Bird Atlas Project data illustrates its value in long-term ecological monitoring and its potential for informing conservation efforts.

Feeding behavioral-influenced differences in microbiome composition of fishes from a local river in KwaZulu-Natal, South Africa

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The presence of antibiotic-resistant bacteria (ARB) and associated antibiotic resistance genes (ARG) in an animal's microbiome can decrease the effectiveness of antibiotic treatment. Antibiotic residues have been detected in wastewater treatment plant effluents and freshwater bodies in KwaZulu-Natal (KZN). The impact of this pollution on wild aquatic organisms is not well understood. This study aimed to detect the presence of ARB in the microbiomes (buccal, cloacal, and skin) of four species of free-swimming fish occupying different ecological niches in the uMsunduzi River (KZN), using both phenotypic and genotypic methods. The fish species examined were *Clarias gariepinus*, *Cyprinus carpio Labeobarbus natalensis Oreochromis mossambicus* with differing guilds. The composition of the microbiomes of the four fish species differed significantly, possibly reflecting the varied ecological niches they occupied. Culture-based analysis using selective media yielded more antibiotic-resistant bacteria from cloacal samples of sediment feeders than from other fish. However, 16S rRNA-based high-throughput-sequencing found that the *Labeobarbus natalensis* and *Oreochromis mossambicus* microbiomes had higher bacterial species richness than the sediment feeder microbiomes, with the skin microbiomes exhibiting the highest bacterial species richness. Across all fish samples analysed, the phylum *Pseudomonadota* dominated the bacterial community, and in most samples analysed, the genus *Pseudomonas* was detected. The results of this study align with the One Health initiative in identifying ARBs in wild animal populations. This study highlights the importance of mitigation strategies aimed at preventing the distribution of ARBs to wild populations, humans, and livestock.

An assessment of the inland small-scale fisheries in the Limpopo Province, South Africa, including an investigation into the knowledge, attitudes and practices of fishery resource users

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Limpopo Province is one of the provinces characterized by poverty and high unemployment rates. As a response, the government through the Department of Forestry, Fisheries and the Environment (DFFE) has identified inland fisheries as a sector with the potential to contribute towards curbing poverty and ensuring food security, especially amongst rural communities that reside in close proximity to large freshwater bodies. Although not well documented, the capture of freshwater fish in Limpopo from impoundments such as Flag Boshielo Dam and Glen Alpine Dam is envisaged to be of major importance to the livelihoods of most rural communities residing in close proximity to these dams. The current study investigated the knowledge, attitudes and practices of small-scale fishery users and the status of the fishery resources on a seasonal basis, from May 2024 to February 2025. Water level fluctuations affected species abundance and composition, with severe water level drops leading to mass fish mortalities. Based on the current preliminary results, it is difficult to identify which species could be used as candidate species for both the Flag Boshielo and Glen Alpine fisheries. Therefore, both fisheries need a serious intervention of rehabilitating the fish stocks

Rabies outbreaks: Subsequent effects on carnivore interactions in a fenced protected area

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Rabies, a prominent zoonotic disease with a high mortality rate, can have catastrophic effects on localised populations. Understanding how rabies is transferred between species is critical in reducing the effects of the virus. However, the subsequent effects that rabies outbreaks have on species interactions may influence ecosystem stability. Disease outbreaks act as natural population control, however, understanding the aftereffects can aid in mitigating the impact of such events. Using camera trap data from the annual Panthera survey in Madikwe Game Reserve (Madikwe), we assessed species interactions pre- and post-rabies outbreak that occurred in the Madikwe lion, *Panthera leo,* population in 2021. Using multispecies occupancy models, we found a notable shift in interaction likelihoods between scavengers such as black-backed jackal, *Lupullela mesomelas*, brown hyaena, *Parahyaena brunnea*, and spotted hyaena, *Crocuta Crocuta,* after the rabies event. This highlights the greater effects that rabies can have in a carnivore community, despite only being confirmed in one species at the time. This information provides a broader understanding of the implications for conservation priorities and long-term recovery plans.

Differences in water depth affect the eDNA detection of marine fish: implications on eDNA assessment reliability

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Environmental DNA metabarcoding (eDNA) is a molecular approach for analysing DNA collected from the environment. eDNA refers to genetic material released through faeces, mucus, and blood. Species are identified from environmental samples such as water, sediment, and air. eDNA analysis offers many advantages over traditional monitoring methods, with the latter being time-consuming, labour-intensive, and intrusive to species. The targeting of specific genetic markers streamlines biodiversity assessment and ecological monitoring. This study assessed the capabilities of eDNA metabarcoding in detecting fish species at uShaka Marine World and compared results to the existing fish inventory. Samples were collected from the intake pipe and feed provided to tank occupants on the sampling day. DNA extracted from the feed was sequenced using Sanger sequencing and included in the reference library with GenBank sequences. Water samples were collected from three depths: surface, middle, and bottom of the Snorkel Lagoon tank. eDNA samples were filtered, and the DNA was extracted. Samples were amplified using Universal fish primer cocktails and then underwent high-throughput sequencing. Fish species showed variations across depths, demonstrating layer-specific preferences, while seven species were found across all layers, showing adaptability. The issue of missing species needs to be addressed for future eDNA metabarcoding studies. This can be achieved by subsampling and adding their sequences to databases such as BOLD and GenBank. Additionally, multiple specific primers should be used to improve species identification. Once these limitations are resolved, eDNA metabarcoding will be a vital tool for biodiversity monitoring and ecological assessment.

Are protected areas protecting freshwater fish? A review of the protected area network and the role of selected provincial nature reserves in the Western Cape

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Freshwater systems and their associated biodiversity are among the most threatened ecosystems globally. The 2018 National Biodiversity Assessment indicated that freshwater fish are the most threatened taxonomic group in the country, with the Cape Fold Ecoregion as a hotspot of endemic and threatened fish taxa. The main threats to indigenous fish in this region are predation and competition from invasive alien fishes, and habitat degradation. The region also has an extensive protected area (PA) network biased towards high-altitude mountainous areas. This network protects an array of ecosystems, but limited information exists on its role in conserving freshwater fishes of the region. We evaluated the value of PAs for the protection of freshwater fishes in the Western Cape Province through assessing both species representation and protected area effectiveness. This was done by setting species conservation targets and then intersecting species distribution data using protected area polygons. Conservation targets were set following the minimum viable population required for long-term persistence. This, along with population viability and PA effectiveness was used to determine whether a species is effectively protected by a PA. Species were classified into one of four categories: 1) well protected, 2) moderately protected, 3) poorly protected, and 4) not protected. Using these results, the role of selected provincial nature reserves was evaluated through fine-scale field surveys to determine the current status of indigenous fish populations on the reserve and identify the primary threats. These results have implications for protected area expansion and management for improved conservation of indigenous fish.

A taxonomic review of *Sphaerotherium* (Brandt, 1833) (Sphaerotheriida, Sphaerotheriidae) species in South Africa using selected morphological characters

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The genus *Sphaerotherium* is endemic to Africa and has the largest-sized millipedes in Sphaerotheriida. The genus is diverse with more than 60 species in South Africa. However, there is limited information regarding most species since their original descriptions. This study aims to revise species descriptions using morphology to verify taxonomic status. More than 728 museum specimens (KwaZulu-Natal, Iziko, and Ditsong), including 27 types from different South African localities, were examined using a light microscope. Both males and females of each species were examined. Images of these specimens and selected morphological features (antennae, endotergum, gonopods, and vulva) were taken. These were compared with the original illustrations and also the current revision. Variations were observed amongst the specimens in terms of body colour, endotergum, number of cones, and reproductive organs. For example, there were differences in a number of sensory cones for specimens labelled as *S. dorsale*. The analysis identified 15 known species using selected characters. Some of these species had variation (number of sensory cones, shape of pygidium and surface texture) among specimens, suggesting geographic variation or species complexes. Therefore, a molecular study is recommended in an attempt to resolve the real species of the genus.

Energy conservation through behaviour and physiology: Does communal roosting affect normothermic and heterothermic responses in red-headed finches (*Amadina erythrocephala*)?

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As small, flying endotherms, birds have high energetic costs for thermoregulation, largely due to their high surface-area-to-volume ratios for heat loss significant. To conserve energy under cold conditions or when food is scarce, birds can use behavioural and physiological strategies such as communal roosting and shallow rest-phase hypothermia. While these strategies are typically studied independently, birds may use them concurrently in the wild to increase energy savings. We aim to quantify the interplay between energy-conservation strategies in the red-headed finch (*Amadina erythrocephala,* n = 30). This species roosts communally in the wild and food-deprived individuals are reported to use shallow rest-phase hypothermia in the laboratory. We are using indirect calorimetry and thermometry to measure metabolic rate and body temperature in finches over an air temperature range of 5–20°C. Birds are measured during the nighttime, while roosting alone, in pairs, and in groups of four, and under both well-fed and (*ad lib*) and food-deprived (food removed 8h before measurements) conditions. We predict that well-fed birds will not use shallow rest-phase hypothermia, but that the metabolic rate of individuals will decrease with increasing group sizes due to the energetic benefits of communal roosting. We expect that food-deprived birds will use shallow rest-phase hypothermia when measured individually, but hypothermia will decrease in frequency and magnitude with increasing group sizes of roosts. Determining how birds integrate behavioural and physiological mechanisms of energy conservation is key to understanding how they can survive periods of high energy demand and low energy supply in the wild.

Stress responses of sociable weavers to the presence of pygmy falcons resident on their colonies

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Understanding how animals respond to environmental stressors, behaviourally and physiologically, is crucial for effective conservation efforts. Sociable weavers (*Philetairus socius*) have a complex relationship with Pygmy falcons (*Polihierax semitorquatus*), which use their nests for roosting and breeding. While this is thought to be of mutual benefit, Pygmy falcons may prey on sociable weavers, and in turn, weavers often exhibit agitation and use alarm calls in the presence of falcons, suggesting that falcon presence may be a stressor for weavers. We evaluated the physiological and behavioural stress responses of weavers to the presence of falcons at their colonies. As a prerequisite for the physiological assessment, we conducted an adrenocorticotropic hormone challenge test to validate an enzyme immunoassay (EIA) for faecal glucocorticoid metabolite (fGCM) analysis in sociable weavers. To determine whether falcon presence is perceived as a stressor by weavers, we collected droppings from free-ranging, non-breeding sociable weavers in colonies with and without pygmy falcons. Additionally, we experimentally tested the responses of weavers to falcon presence by presenting weavers in colonies without falcons with visual and vocal cues of a Pygmy falcon, and a non-predator avian species as a control. Faecal samples collected from both free-ranging and experimental weavers were analysed using the validated EIA (an 11-Oxoaetiocholalone II assay), and anti-predator behaviours of experimental birds were recorded. We predict that weavers in colonies with falcons and those experimentally exposed to falcon cues will have higher fGCM concentrations, indicating that falcon presence is a stressor for these birds.

Dangerously beautiful, or beautifully dangerous? People's perceptions of the southern African python (*Python natalensis*)

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Southern African pythons (*Python natalensis*) are the largest snake in southern Africa; they are steeped in mystery and feature extensively in folklore, religion and cultural beliefs. We conducted a questionnaire survey of 439 participants across southern Africa, gathering information on the respondents' perceptions, understanding and knowledge of these snakes to assist in informing conservation and education initiatives. The respondents were mainly from KwaZulu-Natal Province, South Africa, from rural and urban areas, 18 years or older, and were from as wide a variety of cultural backgrounds as possible. We established the participants' demographics and asked questions on several topics, including their attitude towards pythons, the perceived ecosystem services pythons provide, the perceived negative impacts pythons have, what cultural beliefs pertained to pythons and if they had any feeding, breeding or behavioural records of pythons, amongst others. The results were encouraging, 69% of the respondents viewed these pythons positively, 10% viewed them neutrally, and only 21% viewed them negatively. "Beautiful" used to describe them most frequently (n = 58;14%), with "love" the second most frequent (n = 49; 12%), followed by "scared" (n = 47; 11%) and "important" (n = 45; 11%); "dangerous" was used 24 times (6%). Pest control was mentioned by 55% of the respondents as a positive impact, while 37% recognised their threat to livestock as the worst negative impact and 15% of respondents thought they were a threat to humans. The survey reveals an underlying fascination with pythons and an overall curiosity, despite fear, misunderstanding and misinformation.

Patterns of wildlife-vehicle collision in montane environments

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Road networks are increasing on the African continent, including mountainous areas that often host high endemism and unique biodiversity, coupled with rugged terrain. It is not clear whether the collision and associated mortality risk posed by increased vehicular access to mountains is distinct from the risk that vehicles pose in low-lying regions. Here, we investigate patterns of roadkill in Africa based on a published dataset of vertebrate roadkill on the African continent. We estimated roadkill rates for 15 different amphibian species, 98 reptilian, 261 avian, and 273 mammalian species, comprising 5,549 individual roadkill records. To describe the topography of the study sites, we used the 90m Digital Elevation Model downloaded from Google Earth Engine and classified “high” elevation mountains as regions lying above 2000 meters above sea level (masl), “moderate” elevation between 1500 and 2000 masl, and “low” regions as areas below 1500 masl. We also extracted slope and the topographic ruggedness index. The highest ruggedness was found in high-elevation mountains, but roadkill rates peaked at moderate elevations (21.1 individuals/km/survey day). The lowest roadkill rates occurred at high elevations (0.32 individuals/km/survey day), but, crucially, this was also where the highest proportion of vulnerable and endangered species were killed (10.1% of species killed in these areas). We discuss the potential mitigation measures and pitfalls of continued development on the biodiverse African continent, considering the demands for improved infrastructure, stable ecosystems, and the key ecosystem services they provide.

From Rivers to Oceans: Exploring Fish Trypanosome Biodiversity in Southern Africa

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Species of the genus *Trypanosoma* are flagellate haemoparasites infecting all vertebrates except those in Antarctica. While terrestrial mammal trypanosomes are well-studied, those in fishes remain less explored. This gap is evident in southern Africa, where only five fish trypanosome species have been reported. The South African coast, rich in marine biodiversity, has only two documented marine trypanosome species—one in teleosts and another in elasmobranchs. This study addresses this gap by examining marine fish trypanosomes along South Africa's southern coast. Blood samples were collected from 246 fish across 23 species at various locations between 2020 and 2023. Giemsa-stained smears and molecular analyses targeting the 18S rRNA gene identified four species: *T. nudigobii* from klipfish and three new species: *Trypanosoma sp. A* from prison goby, *Trypanosoma sp. B* from white steenbras, and *Trypanosoma sp. C* from five mullet species. In the freshwater realm, 16 fish trypanosome species were originally identified in the early 1900s, later reduced to six. Currently, three species are recognised in southern Africa: *T. tobeyi* (clariid host), *T. toddi* (cyprinid host), and *T. mukasai* (clariid, cyprinid and other host groups). Molecular data from cichlids and clariids in Botswana in 2005 suggested that what is morphologically identified as *T. mukasai* represents two genotypic groups. To address this, the present study examined between 2019 and 2024 *Clarias gariepinus* from five southern African populations, confirming the presence of *T. mukasai* and identifying a new species (*Trypanosoma* sp. D), suggesting prior misidentifications of *T. mukasai*, especially from cichlids in southern Africa.

Response of bird taxonomic and functional diversity to Forest local and landscape characteristics in the Southern Mistbelt Forest in KwaZulu-Natal, South Africa

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Forest ecosystems are under threat from anthropogenic activities, including land use change, agricultural conversion and fragmentation. The severe impact of forest disturbances affects the forest communities and, in turn, their important role in ecosystem health and function. We assessed the response of bird taxonomic and functional diversity to structural complexity, heterogeneity, and categorical disturbance in three Southern Mistbelt Forest patches in KwaZulu-Natal, South Africa, in 2024. We used the radius point count to quantify bird species in each forest patch. We used bird functional traits to calculate functional diversity indices. Structural complexity and heterogeneity positively influenced species richness and functional diversity for bird communities, specialists, and generalists, while disturbances had a negative impact. Functional richness and species richness for generalists and specialists increased in the highly disturbed patch. Similar trends were observed with functional evenness. Our results demonstrated the importance of recovering patches as an alternative for bird species while primary patches are continually disturbed. The presence of specialist species, including the Bush Blackcap (*Lioptilus nigricapillus*) and Olive Bushshrike (*Telophorus olivaceus*) in disturbed patches, highlights these patches' potential for avian community conservation. Intact forest patches require management to prevent anthropogenic disturbances, which are important for endangered and vulnerable species. Microhabitat and landscape characteristics are important in understanding the forest systems and how they shape the avian community. For conservation purposes, constant monitoring of secondary forests is important to assess their recovery and importance as a possible biodiversity hotspot.

An Updated Catalogue and Review of Afrotherian (Afroplacentalia) Mammals in the Amathole Museum Collection, Eastern Cape Province, South Africa

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The Mammalogy Collection of the Amathole Museum is one of the most comprehensive mammal collections in Africa, with a specialisation in southern African fauna. It was accumulated over almost 100. The higher-level taxonomy of the Class Mammalia has undergone extensive changes since the adoption of molecular systematic techniques. Phylogenetic reconstructions based on large DNA sequence databases consistently group placental mammals into four Superorders: Laurasiatheria (carnivores, bats, ungulates, whales); Euarchontoglires, a super-clade that includes primates (apes, monkeys and allies), rodents (mouse, rat and guinea pig), lagomorphs, (rabbit and hares), dermopterans (flying lemurs or colugos) and scandentians (tree shrew); Xenarthra (armadillos, anteaters, sloths), and Afrotheria (elephants, sea cows, tenrecs, aardvarks, sengis, golden moles, hyraxes). New relationships have been recognised that have required the erection of new taxonomic groups. Most of the Amathole Museum mammal collection was assembled and accessioned long before this new system was devised, and I undertook this project to begin the re-organisation of the collection according to the new information. I conducted an audit and inventory of all specimens of Afrotheria. Updated their taxonomic details. Specimen details were entered into Excel files, and their localities were mapped. This kind of information has the possibility of transforming biological curricula to include more authentic and inquiry-driven educational experiences.

Perceptions and Practices of Fishers in Inland Water Bodies of KwaZulu-Natal, South Africa

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The governance of inland fisheries in South Africa is shaped by a complex interplay of stakeholders, largely vested in the resources found within public dams. Various fishing sectors, including small-scale, commercial, subsistence, and recreational fishers, constitute this stakeholder group. Among them, recreational fishers play a prominent role because of their direct economic contributions. These sectors are crucial for local sustenance and livelihoods. However, ambiguity surrounding the recognition of subsistence fishing rights in relation to recreational and small-scale fishing has led to conflicts. This study addresses the lack of understanding regarding economically valuable fish species and their exploitation, focusing on perceptions of fishers in specific sections of the uMngeni and uThukela catchments in KwaZulu-Natal, South Africa. Using questionnaire interviews conducted between 2021 and 2023, the study reveals challenges in classifying fishers, reflecting the global complexity of inland fisheries governance. Fishers' insights highlight ecological imbalances between native and invasive species, with economic considerations emphasising the market value of certain species, notably *Cyprinus carpio*. Subsistence fishers predominantly engage in river fishing, contrasting with recreational fishers targeting impoundments. A significant portion of subsistence fishers consume fish infrequently but rather sell it. The study underscores the need for comprehensive management strategies encompassing water regulations, fish ecology, and economics to ensure the sustainability of inland fisheries.

Solitary living is more complex than we thought: Kin based spatial structure and social tolerance in a solitary mammal

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Kin selection theory is important for understanding the evolution of social behaviour in group living species. Yet, the influence of kinship in solitary species has received little attention. Solitary living in mammals is assumed to be primitive and due to social intolerance leading to high levels of aggression. We studied how kinship influences spatial structure and aggression in a predominantly solitary species, the South African bush Karoo rat (*Otomys unisulcatus*). Over three years, we performed trapping, focal animal observations and dyadic encounter tests. We also fitted mini-GPS dataloggers on 125 neighbouring females. Bush Karoo rats are not dispersed randomly but show a kin-based spatial structure, with close kin living close to each other. Their home ranges overlapped more with each other more than with strangers. Females directed almost no aggression towards their offspring, not even adult offspring that had already dispersed. This makes it unlikely that aggression and social intolerance lead to dispersal and solitary living. However, females were more aggressive towards non-kin than kin neighbours. Thus, kinship is important in this solitary rodent and its social system is not driven by aggression and intolerance, but rather a lack of attraction.

Re-evaluation of the River Eco-status Programme in KwaZulu-Natal Province rivers after 10 years

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Rivers are increasingly threatened by human activities, emphasizing the urgent need for sustainable management and monitoring of these vital ecosystems. In KwaZulu-Natal (KZN), South Africa, the River Eco-status Programme has been instrumental in monitoring and assessing the ecological health of rivers in the region. As part of this program, Evans et al. (2022) conducted a study that examined fish community structures across the KZN Province during a severe drought. The study highlighted challenges such as limited species distribution knowledge and the impact of non-native invasive fish species on native fish populations. One key recommendation from the study was to re-evaluate fish communities in KZN rivers after several years of anticipated above-average rainfall to assess the recovery of fish species and targeted species not captured in the Evans et al. (2022) study. In response to this recommendation, REMP is undergoing a comprehensive re-evaluation after 10 years to bridge the gaps identified in the previous study, assess changes in fish communities and river health. Fish community assessments will be conducted at relevant sites using methods described in Evans et al. (2022), with additional sites selected to assess specific stressors and long-term changes. In situ water quality will be assessed, and the Fish Rapid Assessment Index (FRAI) will be conducted to associate fish community assessments with management objectives. The findings of this re-evaluation are expected to provide valuable insights into long-term changes in the ecological integrity of KZN rivers, to contribute to the conservation and sustainable management of rivers.

Reproductive science: a cornerstone of wildlife conservation

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In 2024, the IUCN reported that 28% of the 166,061 species assessed to date are threatened with extinction, including 41% of amphibians, 26% of mammals and 12% of birds. The sustainability of viable populations of wildlife species depends on both maintenance of habitat, as well as an understanding of the behaviour and physiology of individual species. Recovery programmes for critically endangered species need the assistance of reproductive scientists to be successful in increasing the population size and selecting individuals for genetic diversity. However, such programmes often fail due to insufficient knowledge on basic reproduction for different genera, such as seasonality, female estrus cycle, structural anatomy, gamete physiology and site for semen deposition or embryo transfer. In male reproduction, semen and sperm analysis is the cornerstone of relative fertility assessments. Our efforts to assess the quality of individual semen samples include evaluating various sperm functional parameters to determine a male's potential fertility. So, how can we apply existing knowledge of semen assessment to improve our efforts in conserving wildlife? In our experience with various wildlife species, standardization and optimisation of protocols for sperm evaluation is an essential step before comparable data can be generated. With the assistance of computer-aided sperm analysis, various sperm characteristics can be evaluated objectively to generate large quantities of data. Results should then be carefully interpreted using multivariate statistical analysis in order to possibly select individuals for maintaining future genetic diversity as well as for selecting the best method of artificial reproductive technologies.

Heavy metal accumulation in the body tissues of Mozambique tilapia and White-breasted cormorant from Loskop Dam, South Africa

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In South Africa, the Olifants River is one of the most heavily utilised rivers with effluent from industrial and mining activities in its upper catchment area introducing heavy metals into the system. In this study the accumulation and health effects of heavy metals and metalloids in the Mozambique tilapia and the White-breasted cormorant from Loskop Dam, which is situated on the mainstem of the Olifants River, were determined. Field surveys were conducted in July 2024 and March 2025 whereby physico-chemical parameters were recorded to determine water quality whilst water, sediment and tissue samples were taken to be analysed for metal content at an accredited laboratory. Fish health was assessed using the health assessment index and bird health using fat indices and fluctuating asymmetry. Standard procedures were adhered to when sampling, handling and dissecting animal specimens. Tissue samples of muscle and liver from 31 fish and the breast muscle and liver from 15 bird carcasses were extracted, with the latter received from Mpumalanga Tourism and Parks Agency officials. Except for temperature, the water parameters were similar between surveys and fell within the target water quality ranges (TWQR) stipulated by the Department of Water Affairs and Forestry (1996). For survey one, aqueous concentrations of zinc were slightly higher than the TWQR. Metals detected in sediments exceeded the TWQR in the following order Fe>Al>Mn>Cr>Cu>Zn. Metal concentrations in water and sediment for the second survey, including the body tissue of fish and birds for both surveys, are in the process of being analysed.

Nest characteristics of African crowned eagles and black sparrowhawks in urban mosaic landscapes: Potential constraints in finding nesting sites and implications for exotic tree management

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The increase in human population and continuous landscape transformations, especially in urban areas, will result in most of the natural habitats being degraded, significantly reduced in size and lost. Consequently, constraints in acquiring resources such as nesting sites and food may occur. In this study, we investigated the nesting site characteristics of two raptor species in the urban mosaic landscape of Durban, KwaZulu Natal, South Africa, to determine the potential constraints affecting acquiring nesting sites. Between October 2020 and July 2021, we visited a total of 52 nests occupied by the African crowned eagle (*Stephanoaetus coronatus*, hereafter crowned eagle) and the black sparrowhawk (*Accipiter melanoleucus*) in our study area and compared the nest characteristics of the two raptors. Our results showed that exotic tree plantations were the most commonly used as nest sites by both species, suggesting that exotic trees may be crucial in providing nesting sites for both species in this highly modified landscape. Furthermore, our results showed that there was no significant difference in nest height, tree cover, nest cover and distance to (i) road, (ii) building and (iii) water of nests occupied by the two species. However, there was a significant difference between tree height and nearest neighbour distance. Tall, mature trees, slightly isolated from other trees, influenced nest site use for our study species. Innovative conservation measures and strategies could be vital in protecting raptor nesting sites (i.e., exotic tree plantations) in urban mosaic landscapes with natural and managed green spaces.

Evaluating the efficacy of eDNA metabarcoding for detecting and monitoring native and invasive freshwater fish in South African river systems

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Environmental DNA (eDNA) metabarcoding has emerged as a powerful tool for monitoring freshwater biodiversity, providing a rapid, non-invasive, and cost-effective alternative to traditional survey methods. This study assessed the efficacy of eDNA metabarcoding for detecting native and invasive fish species in South African rivers using a multi-marker approach targeting the cytochrome oxidase I (COI), 12S rRNA, and 16S rRNA gene regions. Water samples were collected from 15 localities (nine in KwaZulu-Natal, three in Limpopo, and three in Mpumalanga) and analysed using high-throughput sequencing. The sequencing generated 904,980 raw reads and 3,631 amplicon sequence variants (ASVs), with 359 ASVs taxonomically assigned to fish. The COI marker exhibited the highest detection efficiency, identifying 270 fish ASVs across multiple families, while 12S rRNA and 16S rRNA identified 54 and 35 ASVs, respectively. Despite the challenges in achieving species-level identification (23% confidence), the study successfully detected a diverse fish community, including both native species and nine invasive species such as *Poecilia reticulata*, *Micropterus salmoides*, and *Cyprinus carpio*. These findings highlight the potential of eDNA metabarcoding for large-scale fish biodiversity monitoring in South Africa. However, improved reference databases and species-specific primers are needed to enhance taxonomic resolution. Our study showcases the value of eDNA as a conservation tool for tracking biodiversity changes, detecting invasive species, and informing freshwater management strategies.

Metazoan parasites of ornamental fish of the Cichlidae of Neotropical origin

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The trade of ornamental fish provides a pathway for the global translocation of parasites. As a consequence, a study involving a total of 229 specimens from seven ornamental species of Cichlidae were received from three countries: Indonesia (In), Sri Lanka (SL), and Thailand (Th) and scrutinised for parasites. Standard procedures were applied when handling, dissecting, and examining fish, including the fixation and preservation of parasites. The infestation indices – prevalence (P) and mean intensity (MI), were calculated. Of the fish examined, 71.4% (4 out of 7 species) carried parasites. A total of eight parasite species were reported: Monopisthocotyla (6), Cestoda (1), and Nematoda (1). Five fish species were reported to have monopisthocotylan on the gills. The highest prevalence of 100% occurred from *Astronotus ocellatus* SL/In/Th and *Pterophyllum scalare* (Th). The lowest P = 8.7% was observed for *Cichlasoma* sp. from SL. The highest MI of 473.5 for monopisthocotylan was recorded from *A. ocellatus* (Th), with a single specimen being recorded from *Andinoacara pulcher* (SL), *Cichlasoma* sp., and *Uaru amphiacanthoides* (both In). The cestode, *Schyzocotyle acheilognathi* was found in the intestine of *Cichlasoma* sp., (P = 21.7%, MI = 2.4), from Thailand. The nematode, *Capillaria pterophylli,* occurred in the intestine of *P. scalare* (In/SL) with P = 46.67% and 5%, respectively, *A. pulcher* (SL) P = 20.8%, and *U. amphiacanthoides* (In) P = 6.67%. The present findings confirm the translocation of parasites along with their hosts. This study was supported by the DSTI-NRF SARChI Chair (No.101054).

Diversity of bryozoans associated with the shells of the commercial South African abalone *Haliotis midae* Linnaeus, 1758 along the Western Cape, South Africa.

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Marine molluscs, including abalone (*Haliotis midae* Linnaeus 1758), serve as secondary substrates for epibionts, supporting distinct communities that enhance biodiversity in littoral habitats. These epibiotic communities rely on molluscan shells to tolerate environmental pressures. Despite the ecological significance of these associations, research on bryozoans encrusting mollusc shells is limited. This study examines the taxonomic diversity and species richness encrusting farmed and wild *H. midae* shells from six sites along South Africa's Western Cape. Sampling occurred during winter (May–August 2024) totalling 15 cultured and 25–30 wild abalone shells. Bryozoan colonies were preserved in ethanol, prepared for SEM imaging, and analysed for morphological traits. Species richness and variation will be assessed using Shannon-Wiener (H') and Pielou's Evenness (J'), with ANOVA or Kruskal-Wallis tests comparing richness across sites. No bryozoan colonies were observed on farmed abalone across two sites. On wild-caught abalone shells; seven bryozoan species were observed namely; *Beania minuspina*, *Calyptotheca nivea*, *Chaperia capensis*, *Celleporaria tridenticulata*, *Schizosmittina lizzya*, *Hippomonovavella formosa*, *Chaperiopsis* sp. most of which were observed across multiple of the four sites with some only observed in certain areas. Diversity increased from zones G to A. Morphological traits will be analysed via PCA, while PERMANOVA will test for significant differences between farmed and wild environments. Mapping in R will compare observed distributions with historical records. This research aims to fill a knowledge gap in bryozoan biodiversity on *H. midae*, contributing to fisheries management and conservation.

Comparative analysis of sperm characteristics in Cape honey bee drone ejaculate *versus* sperm stored in the queens' spermatheca

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Honey bee propagation relies on the successful transfer and storage of sperm, where drone ejaculate is deposited into the queen's copulatory organ during mating flights, and subsequently stored in the queen's spermatheca. Knowledge regarding the effect of drone and queen sperm storage organs on sperm characteristics in the Cape honey bee remains limited. This study investigates the physiological and biological differences between freshly ejaculated drone sperm *versus* sperm retrieved from the queen's spermatheca. Sperm characteristics assessed include semen volume, sperm concentration, motility, kinematic parameters, vitality and structural properties. Phase contrast, electron, and fluorescence microscopy, along with computer-aided sperm analysis, were employed for analysis. Freshly ejaculated drone sperm exhibited a higher percentage motile sperm (36.7%) compared to sperm stored in the queen's spermatheca (27.3%), although the difference was not statistically significant (P = 0.46). In contrast, sperm vitality significantly declined following storage in the queen's spermatheca, with drone ejaculate displaying substantially higher vitality (67.3%) compared to spermathecal sperm (24.6%) (P = 0.001). These findings highlight the physiological differences between freshly ejaculated and stored sperm, with notable declines in both motility and vitality following spermathecal storage. Reduced motility may result from adaptations that enhance sperm longevity, while the decrease in vitality is likely influenced by aging, storage conditions, and limited availability of nutrients or oxygen. Mechanisms such as metabolic suppression and oxidative stress resistance likely play a role in sperm preservation, enabling extended storage. Understanding these biological processes provides valuable insights into honey bee reproduction and colony sustainability.

1KSA- Decoding South Africa's Biodiversity

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South Africa is one of the most biodiverse countries in the world, with many institutions researching and documenting local biodiversity. However, South African scientists often conduct genetic research overseas to take advantage of competitive prices internationally. This contributes to a drain of skills, data, knowledge, and opportunity out of South Africa.

To mitigate this challenge and build capacity for designing and carrying out biodiversity genomics experiments in country, a South African Biodiversity genomics program called 1KSA (www.1kSA.org.za) was launched, in 2023, by DIPLOMICS, an Omics Research Infrastructure program supported by the Department of Science, Technology and Innovation's SARIR program (South Africa Research Infrastructure Roadmap).

Following a successful species nomination application, South African sample contributors submit DNA for species of interest to one of several 1KSA partner labs. Whole genome sequencing takes place using Oxford Nanopore Technology PromethION devices, and a draft genome assembly is generated using the 1KSA pipeline on the Centre for High Performance Computing. All lab protocols and the 1KSA draft genome assembly pipeline are documented in the 1KSA Zenodo community and on GitHub. The resulting data are stored using the Data Intensive Research Initiative of South Africa; are made known via the generation of species information cards on the 1KSA website; and access can be requested through the 1KSA Data Access Committee.

An overview of the 1KSA project will be presented, highlighting the outputs of the pipeline and how the metrics are recorded on the 1KSA species information cards published on the 1KSA website.

Water quality and macro-invertebrates responses to land use and climate changes in KwaZulu-Natal rivers

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Freshwater ecosystems have been vital in supporting human livelihoods since ancient times. Presently, anthropogenic factors exert a global impact on freshwater ecosystems, primarily because of pollution, water abstraction, and the construction of physical barriers in rivers. Achieving clean water and sanitation (SDG 6) remains a significant challenge in African countries, including South Africa, where infrastructure failures, inadequate legislative implementation, and sporadic pollution events have degraded freshwater environments to unacceptable levels. We are reassessing the biological responses at 52 sites across KwaZulu-Natal, South Africa, that were used in the River Eco-status Monitoring Programme (REMP) to re-evaluate the ecological status and function of KwaZulu-Natal rivers during a period of above-average rainfall and recorded flooding in 2024-2025. These sites were surveyed during the 2014-2016 drought (Agboola et al. 2019, 2020a, b; Evans et al. 2022). We studied the macro-invertebrates through the SASS5 technique as one component. We also collected diatoms and 2L water bottles to complement in situ water quality monitoring. We are 75% through with our fieldwork, having covered the low flow season of 2024, the high flow season of 2024 and most recently, the high flow season of 2025. These surveys assist in a comprehensive collection of relevant data to understand the impacts of climate and land use changes, especially when compared to long-term existing databases. In our study, with the monitoring of biological responses, we aim to contribute valuable data for holistic river management, offering valuable insights into freshwater ecosystems' overall health and functioning with a changing climate and land uses.

High human presence is correlated with lower faecal glucocorticoid metabolite levels in an urban bird population

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Urban wildlife must cope with diverse challenges and stressors, including human presence. However, in addition to being a disturbance, humans can provide energy-rich food and protection from predators. We evaluated the impact of human presence on red-winged starlings (*Onychognathus morio*) in a highly urbanized environment using faecal glucocorticoid metabolite (fGCM) concentrations as a stress-related biomarker. We performed an adrenocorticotropic hormone (ACTH) challenge to validate a non-invasive method for quantifying glucocorticoids in red-winged starlings. Using this method, we quantified fGCMs in excreta collected from free-living starlings during weekdays (high human presence) and weekends (low human presence) to determine the birds' responses to fluctuating human numbers. Following the ACTH challenge, starlings' circulating glucocorticoid (GC) concentrations increased by 127% within 30 min and the corresponding fGCM concentrations increased within 1 h of injection. Of the four enzyme immunoassays (EIA) tested, an 11-oxoaetiocholanolone EIA, performed best. Human foot traffic was significantly higher on weekdays compared to weekends, yet free-living red-winged starlings showed overall 30.4% lower fGCM concentrations on weekdays compared to weekends. The correlation between fGCMs and human foot traffic may suggest urban red-winged starlings benefit from human presence. Our results raise the possibility that, under certain conditions, the benefits associated with human presence outweigh potential negative effects associated with human activity, at least during the non-breeding season.

Assessing the persistence of Blacksmith Lapwings (*Vanellus armatus*) and Crowned Lapwings (*Vanellus coronatus*) in an urban area, Pietermaritzburg, KwaZulu-Natal.

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Urban development leads to fragmentation, which creates a mosaic of natural and/or managed landscapes with varying biodiversity levels. Environmental changes have the greatest impact on bird population, and agricultural intensification is one of the factors contributing to a decline in bird populations. The effects are reflected in the declining numbers of open-habitat species. Nevertheless, several bird species continue to exist in some urban areas, often due to behavioural plasticity. Blacksmith Lapwings (*Vanellus armatus*) and Crowned Lapwings (*V. coronatus*) are two of the species documented persisting in urban areas in South Africa. The study focuses on the assessment of the persistence of these lapwing species in a mosaic of urban landscapes of Pietermaritzburg, KwaZulu-Natal, South Africa. The occurrence, habitat use, and behaviour in human-modified habitats was assessed; and the influence of human activities and different land uses on their nesting ecology in this urban mosaic landscape was determined. We surveyed different sites and recorded data on their monthly abundance, habitat use, behaviour and nesting ecology (during breeding seasons). Blacksmith and Crowned Lapwings co-exist with each other in urban areas and persist in human-modified landscapes, and they vacate if habitats are unfavourable for them. Species abundance varies seasonally, more during non-breeding and less throughout breeding season. The eggs and hatchlings were affected by environmental factors and/or predation. Despite this, both species do persist in open, short grasslands in natural and managed green spaces in this urban mosaic landscapes.

A brief local history of the use of animal-borne video cameras to study the trophic ecology of penguins

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Enabled through technological developments in bio-logging devices, particularly video cameras and accelerometers that can both be deployed on penguins, we have been able to assess important aspects of penguin biology in relation to specific ecological contexts. Here I will provide an overview of the most relevant research findings obtained through the deployment of small video cameras on penguins since we started with this work about a decade ago. The use of these penguin-borne video cameras has enabled us to see how they perceive the underwater world and behave in relation to various circumstances. I will highlight the first observations of kleptoparasitism at sea in penguins and observations where prey clearly defend themselves against attacking penguins, enhancing our understanding of their trophic ecology. I will furthermore show interactions of penguins in Antarctica with Antarctic krill and demonstrate the importance of group foraging, at-sea vocalization and interspecific foraging facilitation in African penguins revealed through these cameras. I will conclude by providing some of our recent research findings using deep learning, enabled through video data, to estimate individual prey capture events in foraging penguins.

Mortality and behavioural changes in *Culex* sp. larvae after exposure to carbaryl and pymetrozine

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Pesticides play a crucial role in agriculture and are extensively used in developing countries to ensure food security and economic prosperity. However, as the climate is changing (rise in temperature and precipitation), the efficacy of pesticides is reduced leading to more frequent application and extensive use of pesticides causing greater adverse effects on aquatic systems. To mitigate the environmental effects of pesticides, the least toxic pesticides such as pymetrozine (a selective "Environmental Protection Agency Reduced Risk pesticide") should be preferably used and recommended for Integrated Pesticides Management (IPM) whereas highly toxic ones such as carbaryl should be phased out to reduce pesticide pollution and unintended death of non-target aquatic organisms. The present study aimed to evaluate the effects of carbaryl and pymetrozine on the behaviour of mosquito larvae (*Culex* sp.). Mortality experiments showed that carbaryl (0, 12.50, 25, 50 and 100 µg/L) caused more mortality than pymetrozine (0, 6.25, 12. 50, 25 and 50 mg/L), and exposure to both insecticides altered the breathing, swimming and resting behaviours of the mosquito larvae. Carbaryl generated an LC_{50} that is more than 100 times smaller than that of pymetrozine, further proving the high toxicity of carbaryl. The larvae spent more time breathing in the absence of these insecticides, more time swimming and resting in the presence of these insecticides. Moreover, these toxicants altered the geotaxis of these organisms thus compromising their fitness. The overall results revealed that carbaryl should be phased out in favour of less toxic yet effective insecticides like pymetrozine.

Predicting the risk of lethal dehydration and hyperthermia under current and future climates in bats occupying artificial roost boxes in Poland

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Bats are particularly vulnerable to succumbing to heat stress, demonstrated by multiple reports of mass mortality events during heat waves. Heat-related mortality has been attributed to lethal hyperthermia and/or dehydration in the literature, but the relative contributions of each remain unknown. In Europe, anthropogenic land use changes led to bats being reliant on artificial roost boxes that can get substantially hotter than natural roosts. Hot roosts are a conservation concern, which will be exacerbated by increasing temperatures and heat waves due to climate change. We aim to predict the risk of lethal hyperthermia and dehydration in bats occupying roost boxes in Poland under current and future climates. We first validated the NicheMapR endotherm model for accurately predicting thermoregulatory responses of four bat species (*Pipistrellus nathusii, P. pipistrellus, P. pygmaeus,* and *Nyctalus noctula)*, and the microclimate model for predicting operative temperature in the roost boxes. We found that model outputs closely correspond to published empirical thermoregulatory data for these species, providing confidence in our ability to model responses in natural systems. We are currently modelling the thermoregulatory responses of bats in roost boxes under current and future climates, allowing us to determine the daytime water costs for evaporative cooling and daily variation in body temperature. We will report on the risk of lethal dehydration and hyperthermia of bats, which we expect to increase by the end of the century. This work is important to assess the safety of artificial roost boxes as a conservation practice in the context of climate change.

How small diurnal mammals cope with thermal extremes in the Kalahari

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Meerkats (*Suricata suricatta*) are vulnerable to climate change, as evidenced by recent reports of reduced body mass and higher pup mortality rates. To better understand the mechanisms underlying this vulnerability and to evaluate if other small diurnal mammals respond similarly, we implanted body temperature and activity data loggers into free-living meerkats, Cape ground squirrels (*Xerus inauris*), and yellow mongooses (*Cynictis penicillata*) in the Kalahari of South Africa. Over one year, we closely observed the behaviours of the habituated animals while recording environmental variables that captured the daily and seasonal fluctuations in heat load and heat sink. Our findings reveal how these species thermoregulate under high heat loads by retreating to shade and burrows, foraging for shorter periods, and becoming partially nocturnal. We also show how these species cope with the heat sink by increasing their sun basking duration or reducing their active periods. We compare core body temperature patterns and behavioural modifications among the three species and discuss the implications for their fitness and survival in response to ongoing climate change.

Marabou storks in Limpopo Province as sentinels of ecosystem health: investigating microplastics, diet and gut microbiome diversity from faecal matter

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Microplastics pose an ongoing threat to diverse ecosystems, yet their impact on the Marabou Stork (*Leptoptilos crumenifer*) remains largely unexplored. This study aims to quantify microplastics and assess their effects on the Marabou Stork's diet and gut microbiota through faecal analysis. Samples will be collected from three study sites (game farm, abattoir, and landfill), with 15 faecal samples obtained per locality. Each sample, representing an individual bird, was divided into two portions: one for microplastic analysis and the other for dietary and microbial composition assessment. Microplastics will be extracted using a chemical approach, exploring the use of Fenton reagent or hydrogen peroxide, and will be identified and quantified using FT-IR and SEM/EDS microscopy. Deoxyribonucleic acid was extracted, and PCR amplification followed by Illumina sequencing was performed to analyse dietary composition (ITS and *CO1* genes) and microbial profiling (16S rRNA gene). Sequence data were analysed using Qiagen CLC Genomics Workbench. Preliminary 16S sequencing results from samples collected at the game farm indicate the presence of six bacterial phyla, with *Proteobacteria* (56%) being the most abundant. *Gammaproteobacteria* (56%) dominated at the class level, while *Enterobacterales* (50%) was the most prevalent order. Among 29 identified families, *Enterobacteriaceae* (50%) was the most abundant, with *Escherichia-Shigella* (50%) as the dominant genus. These findings suggest exposure to *Escherichia-Shigella*, which may indicate an unhealthy gut microbiome, environmental contamination, or immune suppression due to dietary influences. However, the preliminary results are inconclusive in establishing a direct relationship between diet and microplastic accumulation.

The use of cellular telecommunication towers as nesting sites by Pied Crows (*Corvus albus*) in urban mosaic landscape

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Corvids exploit urban environments, often using artificial structures for nesting and roosting. The pied crow (Corvus albus) is common in anthropogenic landscapes, breeding and foraging near human settlements. This study monitored their use of cellular telecommunication towers as nesting sites in Pietermaritzburg, South Africa, over three breeding seasons. Of 36 towers across the urban mosaic, 17 (47.2%) were used for nesting, while 19 were not. Many towers were reused in subsequent years, with 41 nests recorded by the end of the study. Towers were spaced an average of 1595.2 ± 151.0 m apart, mainly in the suburbs of Edendale and Northdale. Hotspot analysis showed no clear pattern explaining why some towers remained unused. We assessed pied crow nesting in relation to land cover features and found tower nesting was best explained by cropland (wi = 0.58), forest (wi = 0.94), grassland (wi = 0.66), schools (wi = 0.56), and relief (wi = 0.56). The pied crow's persistence in urban mosaic landscapes is likely driven by the availability of anthropogenic infrastructure, natural or managed green spaces, and food sources. Their behavioural plasticity suggests their numbers will continue to increase in such environments.

Calf growth and maternal energy investment in South African southern right whales

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Southern right whales (*Eubalaena australis*) are capital breeders that rely on accumulated energy reserves to support the costs of reproduction. The lactation period is a particularly energetically costly aspect of their reproduction, making maternal body condition a key determinant of reproductive success. We collected footage of mother and calf southern right whales in Walker Bay, South Africa, over three months of the calving season (July to September of 2022 - 2024) using an unmanned aerial vehicle to investigate maternal investment and calf growth rates through photogrammetric techniques. A total of 209 animals were recorded, however, following data filtering, images of 41 cow-calf pairs were analysed. Our findings indicate that calves of the South African population show an average growth rate of 2.6cm day^{-1} (95%CI: 1.72-3.52). Furthermore, we estimated an average maternal body volume loss of ~18.7% (95%CI: 8.4-27.7) over the three-month period, reflective of the energy investment in the calf. This is markedly lower than the ~25% volume loss over approximately the same time period reported for the Australian population, suggesting a lesser maternal investment in the calf, possibly due to a trade-off to ensure maternal survival. In turn, this may be related to the observed decadal decline in maternal body condition in the South African population that was related to a decreased food availability in offshore foraging grounds. How this affects calf migration size and survival remains to be determined. Our results show that population-specific assessments are critical to improve our understanding on the relationship between maternal body condition and reproductive success.

Can prey recover a tiger population? Assessing long-term prey densities and tiger carrying capacity in a Tiger Reserve in India.

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Prey abundance is a critical determinant of tiger (*Panthera tigris*) population recovery, requiring robust long-term monitoring to evaluate trends and management interventions. We provide long-term data (2010-2022) on principal tiger prey populations which include chital (*Axis axis*), chousingha (*Tetracerus quadricornis*), nilgai (*Boselaphus tragocamelus*), sambar (*Rusa unicolor*), and wild pig (*Sus scrofa*) from Kawal Tiger Reserve (Kawal), Telangana, India. Using 28 systematically placed line transects, we observed a trifold increase in chital population, while sambar, nilgai, and chousingha remained stable. The wild pig population exhibited characteristic extreme fluctuations. Despite Kawal's designation as a tiger reserve in 2012, which enhanced protection, anthropogenic pressures have hindered tiger colonization, with only two females among 11 dispersing tigers recorded over the decade. We used the prey-availability-based models to predict tigers' carrying capacity in the reserve's core area. This suggests the current prey base can support >30 tigers in the core area. However, establishing a breeding tiger population in Kawal may need female reintroduction, and enhancing connectivity with neighbouring Protected Areas with source populations. This study highlights the critical importance of long-term prey monitoring in informing evidence-based conservation strategies, mitigating anthropogenic stressors, and restoring Kawal as a viable habitat for tigers.

Yellow-billed kite nesting and behaviour around Wartburg, KwaZulu-Natal

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The yellow-billed kite (*Milvus migrans parasitus*) is an Afrotropic migratory raptor found throughout sub-Saharan Africa. It is present in Southern Africa from July to March during the summer months, and in South Africa, it breeds from September to December. There is a large population of yellow-billed kites in the Wartburg and Albert Falls region in KwaZulu-Natal. The area has a lot of agriculture and specific features, like crocodile and large-scale cattle farms, which attract kites because of increased food availability. This population has been monitored since 2013, and their nesting, roosting and behaviour have been recorded. The records since 2019 were analysed for over 60 territories, and these were mapped to determine their size and the dynamics that shift and change them. Nesting success, nest tree characteristics and nesting behaviour were determined. Nest sites are often shared with other raptors, such as long-crested eagles (*Lophaetus occipitalis*) and black sparrowhawks (*Accipiter melanoleucus*), and there appears to be a negative impact from Egyptian geese (*Alopochen aegyptiaca*) usurping nests during kite incubation. There is an association with village weavers (*Ploceus cucullatus*) and kite nests as they build their colonies around them. Yellow-billed kites start gathering in February and March in preparation to migrate. Counts of the roosting population at a major roosting area, were conducted since 2020 with thousands gathering there annually. Overall, the yellow-billed kite population in this area appears to be doing well as there is high nesting success with one to three kites produced per nest each year.

South Africa's coelacanths: biodiversity science and conservation catalysts

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A hundred years after fossil coelacanths were first described, the discovery of a live coelacanth off East London in 1938 was described as the zoological find of the 20th century. This specimen was long considered a stray from the Comoros until other Western Indian Ocean records and the discovery of a population at Sodwana Bay in 2000, catalysed new research. This presentation summarises findings and conservation impacts from 25 years of multi-disciplinary research on South Africa's living coelacanths and their ecosystems. South Africa first used a Remotely Operated Vehicle (ROV) to find coelacanths in 2005 after three international submersible expeditions. ROV surveys have since been used to locate coelacanths, study their behaviour, measure individuals recognised by their unique spot patterns and to research marine invertebrate and fish assemblages. Monitoring of individuals of this slow growing and long-lived species has yielded fascinating insights that challenge current understanding of coelacanth movement and offer interesting support to one hypothesis regarding the only extant vertebrate to possess an inter-cranial joint. Ecosystem research has advanced the classification and mapping of seabed habitats that supported a tenfold expansion in South Africa's Marine Protected Area estate and continues to support the identification and management of marine animal forests and sensitive seabed habitats. Exploration of the twilight zone has also produced new species discoveries and supported bio-discovery research. Emerging researchers are now applying eDNA and computer vision with machine learning to continue the catalytic legacy of this iconic fish in advancing marine science and conservation in South Africa.

South African west coast: a foraging ground for individuals from both B- and C-stock of humpback whales (*Megaptera novaeangliae*)

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Humpback whales (*Megaptera novaeangliae*) are a cosmopolitan baleen whale species that usually undertake seasonal migrations from summer high-latitude feeding grounds to winter low-latitude breeding and calving grounds. In the Southern Hemisphere, seven distinct breeding stocks have been identified. These stocks are associated with Management Areas (Areas I-VI) in the Southern Ocean as designated by the International Whaling Commission, which broadly defines the feeding grounds. Following the end of commercial whaling, Southern Hemisphere humpback whale stocks have shown evidence of recovery. Increased connectivity between breeding stocks and changes in movement patterns are anticipated. Photo-identification images taken between 1988 and 2024 by the Mammal Research Institute - Whale Unit, University of Pretoria, were submitted to the web-based application HappyWhale (happywhale.com), and run against its database to search for matches. In total, 447 individuals were identified, of which 43% were re-sighted at least once. Within the B-stock on the African west coast, four individuals were sighted both in Gabon and the west coast of South Africa. Additionally, individuals from the C-stock were also observed on the west coast of South Africa, as shown by the movement to the east coast (3 individuals), Mozambique (2 individuals), Madagascar (2 individuals), and Reunion (1 individual). These findings indicate a geographical overlap between B- and C-stock individuals on the South African west coast, where the rich Benguela Upwelling System supports a low-latitude foraging ground for the species. Genetic data will shed further light on the connectivity and potential gene flow between stocks in the post-whaling era.

Cape gannet year-round occupancy off the southern Cape coast of South Africa

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In southern Africa, the foraging distribution of the Cape gannet *Morus capensis,* an endangered species, has been well studied. The breeding range of this species extends across six islands, with the largest being on Bird Island in Algoa Bay, South Africa. GPS studies of breeding gannets from Bird Island showed gannets foraged as far west as Mossel Bay (> 1000 km round trip). However, with GPS-based studies usually being limited to the breeding season and with a limited sample size, it remained unclear to what extent the gannets were utilizing the southern Cape coast. In this specific area, at 150 m above sea level on Dunefields Private Nature Reserve in Wilderness, we aimed to determine the abundance of Cape gannets in the breeding and non-breeding seasons. Our observations were conducted on 300 daily surveys between 2022 and 2025. We recorded gannets for 65 % of the surveys during the breeding season (maximum 325 individuals per survey) and for 94 % of the surveys during the non-breeding season (maximum 1082 individuals per survey). This is a high percentage of occupancy relative to the distance from the nearest breeding colony. With the greater Wilderness waters having reduced threats from both seals and competition from fisheries compared to Algoa Bay and Cape Town respectively, and subsequently being a year-round feeding ground for gannets, our study highlighted the importance of this seascape for this endemic species.

Spotted in the landscape: do caracals have identifiable spot markings on their face?

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Individual identification is useful in analyses of population dynamics and is therefore relevant for many conservation management applications. Camera traps have shown to be an effective tool to identify individual animals that are cryptic and which are difficult to record otherwise. In most camera trap studies using individual identification, the focus has been on big cats that have a distinct coat pattern e.g. leopard. The caracal *Caracal caracal* is one of the cat species that do not have a distinct coat pattern but as camera-trapping technology has improved, the identification of species with less distinct body markings has become more plausible. We used 20 camera traps at Dunefields Private Nature Reserve in Wilderness to explore whether caracals have unique facial spots that could be used for individual identification. Between 2022 and 2024, daytime photographs were used to identify spot markings on the side of the face. There were 80 day-time facial photographs captured of which 10 (12.5 %) were high-enough quality for spot identification. Facial spots were detected on all ten facial photographs. Identifying caracals by facial spots using camera traps may serve as a method that could be more cost efficient, and less invasive, respectively, than DNA analysis and tagging or collaring the individuals. We anticipate that this study will be useful to researchers interested in studying caracal population parameters using a non-invasive method.

Analysing the taxonomic and genetic diversity of *Corella eumyota* (Traustedt, 1882) in three marinas in the Western Cape, South Africa

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The ascidian *Corella eumyota* has attracted significant attention due to its rapid invasion in the Northern Hemisphere and its uncertain origins in the Southern Hemisphere. Initially described by Traustedt in Chile in 1882, *C. eumyota* was considered native to the entire Southern Hemisphere, including South Africa. However, its reproductive capacity raises questions about this assumption resulting in its cryptogenic status in South Africa. Additionally, recent taxonomic and genetic revisions of the *Corella* genus in the Southern Hemisphere have revealed distinct species, previously misidentified as *C. eumyota*, such as *Corella antarctica* and *Corella brewinae*. Despite these developments, research on *Corella* species in South Africa remains limited. This study aims to assess the potential alien status of *C. eumyota* and identify any additional *Corella* species in South African waters by examining the taxonomic and genetic diversity of these species in three marinas (Granger Bay, Gordons Bay, and Simons Town) in the Western Cape. A total of five settlement arrays were suspended from the jetties in each marina for four months (February 2024 to June 2024) to allow specimens of *Corella* to settle. Specimens were collected by scraping samples from plates and preserved in 80% ethanol for genetic analysis. Ten specimens per marina were morphologically identified and used for genetic analysis – these results are to be presented. The genetic analysis focused on the mitochondrial COI (mCOI) barcoding gene to determine species identity and diversity. This study is the first to compare the taxonomic and genetic diversity of *C. eumyota* in South Africa.

Are we there yet – the journey to assessment and red listing of aquatic fish parasite species

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Following the latest findings from the National Biodiversity Assessment, a biodiversity inventory project, REFRESH was launched for seven freshwater taxonomic groups. The aim of the project is to update and identify gaps in knowledge on these species to inform conservation and management. One of these, freshwater fish parasites, is an often-neglected group that are crucial in providing ecological services and contribute the maintenance of dynamic and balanced ecosystems. In fact, South Africa has a longstanding history of parasitologists studying these organisms. However, we have limited knowledge on current distributions, host ranges and ecology. A user-friendly inventory or database to update newly obtained information to inform inclusive ecosystem conservation and management is also lacking. Further, many parasitic species are not genetically barcoded for inclusion in progressive and non-invasive detection methods during monitoring surveys and others may even be already extinct. Here an overview of newly collected parasite diversity of South Africa is presented, and challenges of incorporating parasites into assessments and conservation strategies are highlighted.

Assessing biophysical model performance for predicting thermoregulatory responses in Fynbos birds

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A hotter and drier future with more frequent fire is predicted for the Fynbos biome. This will result in higher operative temperatures in the landscape, which may challenge birds' ability to maintain body temperature (T_b) through evaporative water loss (EWL), while avoiding dehydration. Accurately modeling the physiological mechanisms underlying Fynbos birds' thermoregulation will aid their conservation, however, it demands extensive species-specific data, which may be difficult to obtain. Therefore, we (1) used a model species, the White-browed Sparrow-weaver (*Plocepasser mahali*), to assess the sensitivity of a biophysical model to variation in species-specific morphological input parameters. We did this by evaluating the model's performance in predicting EWL and T_b under standard respirometry conditions, using morphometric measurements from (a) live Sparrow-weavers from a specific study population and b) museum skins collected across the species range. The biophysical model accurately captured thermoregulatory responses of Sparrow-weavers regardless of morphological parameterisation. We then (2) parameterised the biophysical model for 11 Fynbos bird species using species-specific museum data, and compared model predictions to published respirometry data for these species. Our model accurately captured EWL and T_b for each species modeled, except Orange-breasted sunbirds *(Anthobapes violacea*), where EWL predictions could not be validated. Biophysical models are a promising non-invasive tool to predict animals' thermoregulation, and can be successfully parameterized with morphometric data from museum specimens. By using easily-obtained museum data, biologists can model impacts of climate change on thermal physiology for a large number of species across space and time.

Becoming royal: an investigation of the phenotypic shift observed in *A.m. capensis* when reared in *A.m. scutellata* colonies

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A population of Cape honeybees (*Apis mellifera capensis*) has persisted as social parasites within the commercial Savannah honeybee (*Apis mellifera scutellata*) populations in the northern areas of South Africa over the past 35 years. This population has included only a single clonal lineage for at least 25 years. The lineage is theorised to originate from a special subset of the wider *A.m. capensis* phenotype, resulting in an “elite” lineage with unique queen-like characteristics. We investigated this assumption by determining how queenlike the wild-type *A.m. capensis* bees can become within one generation when reared by *A.m. scutellata*. Young wild-type *A.m. capensis* bees were either used as the control group or introduced to *A.m. scutellata* colonies to produce worker-laid brood. Their daughters were collected from the *A.m. scutellata* colonies and dissected. Morphological features associated with a queenlike morphology (the mass, the number of hairs between the bottom two pollen combs on the left basitarsus, the number of ovarioles, and the size of the spermatheca when present) were assessed. Preliminary results indicate a significant shift towards a queenlike morphology within one generation of being super-fed by *A.m. scutellata*. For any accurate interpretation, a comparison to the phenotype of the clonal population is needed. However, the results are indicative that wild-type *A.m. capensis* can develop queenlike morphologies and that all *A.m.* capensis populations could pose a risk as social parasites.

If you have seen one sperm, you have seen them all OR biodiversity in action?

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This paper is predominantly based on research performed in our Comparative Sperm Laboratory on sperm structure and function of more than 100 species (from invertebrates to primates). It has become apparent that there are indeed major differences in the size, form, and function of even closely related species. Accordingly, the potential role of the fertilization environment, the presence/absence of sperm competition, and many other role players may represent important evolutionary forces driving the shape/structure and function of sperm. Advanced light microscopy, scanning and transmission electron microscopy, computer-aided sperm analysis (CASA), and sperm flagella analysis have been employed to study sperm of a wide range of taxa including invertebrates as well as vertebrates. External spawners such as sea urchins, marine and freshwater fish, anurans to internal fertilizers such as selected insects and a wide range of mammals, including the almost extinct black-footed ferret and the so-called big five of Africa, form part of the study population. Holistically there are two extremes. External spawners all have very simplified sperm with helical swimming patterns providing an improved chance to meet an egg. Sperm of Internal fertilizing species are mostly very complex in structure, designed for swimming in a viscous environment, and they seem to develop a very rapid non-progressive helical type movement referred to as hyperactivation, essential for fertilization. There is also partly an inverse relationship of small mammals having very large sperm, whereas larger mammals produce small sperm. The absence of sperm competition seems to be associated with a high percentage of abnormal sperm forms. The deciphering/implications of these findings will be addressed.

Diving into the parasite diversity of *Diplodus capensis* (Smith) (Teleostei, Sparidae) from southern Africa

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Sparid fishes of the genus *Diplodus* (Teleostei) are popular shore angling fishes found across the globe. Two species of this genus are endemic to southern Africa: *D. capensis* and *D. hottentotus*. Overall, parasites that infect marine fishes in this region are greatly understudied, with the majority estimated to remain undiscovered. For instance, knowledge on the parasite diversity of *D. capensis* is limited to merely six metazoan species: Acanthocephala (1), Copepoda (1), Digenea (2), Isopoda (2). Thus, our study aimed to further investigate the diversity of metazoan parasites from this endemic economically important fish. Fishes were collected from five localities along the South African coast and one locality on the Namibian coast. By using an integrative taxonomic approach applying both genetic and morphological identification techniques, we found *D. capensis* to host a high diversity of parasites belonging to 25 species from 10 parasitic groups: Acanthocephala (1), Aspidogastrea (1), Cestoda (2), Copepoda (3), Digenea (10), Hirudinea (1), Isopoda (1), Monopisthocotyla (6), Nematoda (4), and Polyopisthocotyla (2). This is a remarkable diversity of parasites to be found from a single fish host, especially considering that many of these species are likely new to science. Therefore, this study emphasises the gap in our knowledge of the true parasite diversity of marine fishes in South Africa, strengthens the possibility that most species remain undiscovered, and highlights the need for further explorative taxonomic studies on marine parasites from this region.

Do metal elements and organochlorine pesticides threaten South African elasmobranch biodiversity?

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In 2011, 81 elasmobranch species were classified as threatened in South African waters. Increased anthropogenic activities are a major contributor to the exposure of these species to pollutants. As South Africa is a mineral resource-rich country, elements enter the marine environment through terrestrial run-off. In addition, many organochlorine pesticides that have been banned are still applied and therefore also end up in the marine environment. The aim of this study was to determine levels of selected elements and organochlorine pesticides (OCP) in 21 shark, ray, and skate species along the South African coast. Element and OCP levels were analysed using standard techniques. Spatial differences and accumulation patterns between different elasmobranchs were observed which revealed regional-specific exposure patterns. Of the 22 OCPs analysed only nine compounds were detected. The DDT and its isomers occurred in the highest concentrations, followed by HCBs and chlordanes. Accumulation patterns were related to intrinsic factors (e.g. sex and trophic position) as well as external factors such as migration and foraging behaviour. Species that follow transoceanic migration patterns (e.g. white sharks) had high DDT levels which is the result of exposure from multiple sources and regions. High OCP concentrations were also recorded in philopatric species (scalloped hammerhead and bull shark), which have more restricted movements in and around nearshore and shallower regions. There are no tissue residue-related measures of elasmobranch health. Based on residue levels that are deemed safe for human consumption, most of the species could be regarded to be in a healthy condition.

The benefits of smaller, longer “blitzes”: insights from home and away

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The method of comprehensively assessing subsets or wholes of biodiversity in a single area, known as BioBlitzing, has become increasingly popular among both academics and citizen-science initiatives. Most BioBlitzes, however, happen over large areas in limited stretches of time, e.g. one day or one weekend. Applying the BioBlitz method in a scaled-down area like a single house, playground or stretch of beach, and over a longer timeframe, allows for greater resolution and volume of data, evidenced by a study conducted at a 400 m^2 suburban house which yielded 1,184 species in one year, demonstrating the under-characterised nature of biodiversity in urbanised areas. By applying tenets of this protocol to our primary line of work (fish parasitology), we not only provide comprehensive identification of two kinds of fauna in a particular area (hosts and parasites), but effective baselines for understanding the functional ecology of that area. As the concept of “parasite Blitz” enters the lexicon, we demonstrate that long-term, repeated surveys of a limited area maximises value of survey effort, with appeal to two examples: studies performed at Heron Island on the Great Barrier Reef, Australia, and Tsitsikamma (Garden Route) National Park, South Africa.

Abstracts Poster Presentations

Population genetics structure in the yellow spotted Hyrax *(Heterohyrax Brucei)*

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Studying population structure in a species is crucial, as a reduction in its genetic diversity can lead to a decline in ecosystem diversity. Ecosystems with higher biodiversity tend to be more stable and productive, with key species playing a critical role in ecosystem functioning. A decrease in genetic variation within a population reduces its ability to adapt to environmental changes, affecting long-term survival, individual fitness, and adaptability. Molecular genetics tools are invaluable in conservation research, with barcoding genes serving as tools to confirm species identity and assess population diversity. Microsatellites help reveal species' population structure with these mitochondrial genes and elucidate the relationships among individuals, colonies, and localities. Studies using mitochondrial cytochrome B sequences have shown high genetic diversity in *Heterohyrax brucei*, providing a foundation for future research. Microsatellite loci are instrumental in mapping genetic relationships both within and between populations. This study aimed to confirm species identification using barcoding genes and, secondarily, to optimize and assess the use of microsatellite loci to distinguish *Heterohyrax* populations. Dung samples were collected from dassie colonies in the Waterberg region of Limpopo/Mpumalanga Provinces, Southern Africa. DNA was extracted from these faecal samples and sequenced using 16S and cytochrome B gene regions. After confirming species identity, 21 microsatellite loci were optimized and genotyped to explore population structure further. Analysis revealed high nucleotide/haplo diversity, suggesting a significant level of genetic variation across the population. This study demonstrated the persistence of genetic variation within and between dassie colonies, highlighting the use of environmental DNA in genetic studies.

Bats and Nocturnal Birds in Malawi's Macadamia Plantations: Implications for Biodiversity Conservation

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Increasing macadamia nut production in Malawi presents opportunities and challenges for biodiversity conservation. This study aimed to investigate the diversity of bats and nocturnal birds in macadamia plantations and their role in controlling pests. Using evening transect walks and deployment of autonomous recording units (ARUs), we documented species diversity and evidence of foraging in four macadamia estates, one in each region of Malawi. Our preliminary findings reveal a high species diversity of insectivorous bats and nocturnal birds, including new species records for Malawi. There are differences in species diversity and distribution across the estates. Of the 20 encounters with nightjars, 50% were foraging, bat feeding buzzes were recorded in all four estates. Foraging was observed mostly from 18:30 Hours to 23:00 hours. Evidence of high foraging activity was inferred to pest predation, highlighting the critical role these vertebrates play in pest suppression. This study provides baseline data to inform Integrated Pest Management (IPM) efforts. It shows how ARUs are an effective monitoring tool for nocturnal species while offering a cost-effective and scalable method for biodiversity assessments in agricultural ecosystems. These findings contribute to the wider understanding of ecosystem services by bats and nocturnal birds in agriculture. This study advocates for conservation strategies that support and enhance habitat connectivity between natural forests and agricultural landscapes, ensuring the persistence of these vital species. Therefore, balancing productivity with biodiversity conservation is important, and the government needs to consider the special protection status of natural forest patches in estates.

Splitting hairs: a stable isotope lens into the ecology of an elusive species

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Urbanisation critically alters resource availability and the nature of risks for wildlife by fragmenting natural habitats and disrupting ecosystems. Despite these challenges, carnivores frequently persist in and around urban environments where novel opportunities for prey resources may outweigh associated ecological risks. Here, analysis of carbon and nitrogen stable isotope signatures from fur and whisker samples is used to explore both short and longer-term changes in trophic position, niche width, overlap and shifts in caracals (*Caracal caracal*) foraging on the fringes of the city of Cape Town, South Africa. Despite a wide isotopic niche at the population level, we also observed high levels of individual specialisation. Adult and male niches were generally wider, likely due to larger home ranges and exploitation of diverse prey across trophic levels. Caracals using areas dominated by wildland cover had higher δ^{15}N values and larger niches, while across the study area δ^{15}N values varied spatially with increased enrichment in coastal foraging caracals who regularly exploit seabird prey. When accounting for underlying environmental differences, anthropogenic pressure, measured by the Human Footprint Index, explained variation in both subsidy use (δ^{13}C values) and trophic status (δ^{15}N), suggesting that more urbanized caracals exploit predictable, anthropogenically subsidised prey resources that shifts their diet composition towards lower trophic levels. Individual foraging flexibility in caracal is clearly a key strategy for success in this rapidly transforming landscape. Understanding spatiotemporal shifts in the trophic ecology of adaptable urban carnivores is fundamental for understanding the ecological needs of wildlife in and around rapidly growing cities.

Genetic Differentiation and Taxonomic Implications of the Namaqua Rock Mouse in Southern Africa's Dynamic Grassland Biome

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The Namaqua rock mouse (*Micaelamys namaquensis*) faces genetic differentiation challenges due to rapid radiation and ancestral polymorphisms. We sequenced mtDNA (cytochrome b) and nuclear DNA (AP5, microsatellites), revealing the species to be polyphyletic with five sub-clades and two major clusters exhibiting admixture. The detected diversity and differentiation within this species represent a species complex, with divergence times between lineages suggesting a Late Miocene to Pliocene radiation. The contracting grassland biome in southern Africa has experienced cyclic expansions and contractions, with divergence within lineages aligning with the last three wet periods of the Plio-Pleistocene era, coinciding with savanna habitat expansion. Historically, up to 16 subspecies were described in the Namaqua rock mouse; currently, only four subspecies are recognized (Chimimba, 2001a). The phylogeographic variation found in this study underscores the importance of monitoring climate patterns to track finer scale spatiotemporal habitat changes across southern Africa, which drive diversification in this taxon. Significant genetic divergences found within and between biomes indicate a need for taxonomic revision in this species.

Integrating iNaturalist in Zoology Practical Lecture: A Case study on Arthropod diversity in the Mankweng Area, Limpopo Province

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The use of digital citizen science platforms has become instrumental in biodiversity monitoring and conservation. This study assesses the integration of iNaturalist, a digital platform monitoring tool, and its application in a first-year Zoology practical lecture at the University of Limpopo (UL), focusing on the phylum Arthropoda in the Mankweng area, the Turfloop campus (UL), and its surrounding. Conducted between August 2023 and August 2024, the project engaged 223 students and laboratory assistants, documenting 988 observations of 168 arthropod species. Insects comprised 79.3%, followed by arachnids (14.39%) and other arthropods (6.6%), recorded. Out of 169 species, the most frequently observed species was *Apis mellifera* L., 1758 (honeybee) with 62 specimens reported. Beyond enhancing zoology education, this initiative significantly contributed to the collection of biodiversity data, with 1,716 species classified as either being Leading (32.3%), Improving (36.7%), Supporting (27.5%) or Maverick (3.5%). These findings highlight iNaturalist's potential as a biodiversity monitoring tool, fostering student engagement and conservation awareness. By incorporating citizen science into higher education, this approach facilitates and supports the long-term monitoring of biodiversity whereby the findings can contribute to the collection of research-grade data. This study underscores the value of digital platforms as a means to create conservation awareness and to collect data pertaining to arthropod biodiversity within the area of interest and elsewhere.

Ecological impacts of the Egyptian goose's (*Alopochen aegyptiaca*) range expansion in Kwa-Zulu Natal, South Africa

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As human development intensifies through urbanisation, agriculture, and the creation of man-made water bodies like reservoirs and dams, the Egyptian goose (*Alopochen aegyptiaca)* has been exposed to and found new nesting sites and food sources. The alteration of natural landscapes into modified environments, such as golf courses and farms, provides ideal habitats, with abundant grasslands for grazing and proximity to water. The distribution range expansion and increased abundance of Egyptian geese raise ecological concerns globally, affecting vegetation, native bird species and ecosystems. Here we analyse the distribution range expansion and increased abundance of Egyptian Geese, and the ecological, environmental, and anthropogenic drivers that facilitate their spread and the ecological impacts in KwaZulu-Natal, South Africa. Citizen science platforms, such as iNaturalist and eBird, will be used to obtain data presence and distribution data of Egyptian geese. Data obtained from questionnaires on the perceptions of the public on Egyptian geese will assist in analysing whether their range has expanded and whether they have any ecological or human-wildlife impacts. To get historical data, existing records of Egyptian geese distribution from scientific reports and databases such as the South African Bird Atlas will be used. The results of this study will assist in gaining a better understanding of why the spread of this species is as rapid and successful as it is. The findings of this study will also be significant in managing the impacts of their expansion as Egyptian geese can disrupt local ecosystems.

Seasonal and sex differences in the thermoregulatory responses of European vespertilionid bats at high air temperatures

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Deforestation has drastically reduced natural roost sites for European bats, with artificial roost boxes being a common conservation measure. However, concerns arise regarding the potential overheating of artificial roosts, particularly during summer heat waves. Female bats roosting in summer maternity colonies are especially vulnerable due to the hotter and more humid conditions compared to solitary males. This study investigated sex and seasonal differences in heat tolerance and evaporative cooling capacity in four species of vespertillinoid bats. Using indirect calorimetry and thermometry, we measured thermoregulation at air temperatures (T_a) ranging from 28 to 48°C during spring (male bats only, females in reproductive phase) and summer (both males and females). Contrary to predictions, there were no sex differences in maximum T_a tolerated or evaporative cooling efficiencies. While there were also no seasonal differences in maximum T_a tolerated, male bats unexpectedly had lower maximum cooling efficiencies during summer compared to spring. Moreover, there were sex and seasonal differences in the patterns of increasing evaporative heat loss (EHL) with increasing T_a. Female bats started increasing EHL at higher T_a than males during summer, and male bats increased EHL more gradually with rising T_a in summer compared to spring. These differences in heat-dissipation strategies suggest potential adaptations for enhanced water conservation under hotter and more humid conditions, at both sex and seasonal levels. Using roost temperature and EHL data, we estimated daytime evaporative water costs of bats using artificial roosts, revealing that small bats are already at risk of lethal dehydration during present-day heat waves.

Unwanted diversity: parasites associated with ornamental fish imported into South Africa

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Annually, millions of ornamental fish from over 100 countries are being exported worldwide. However, in South Africa, there is currently no legislation requiring that imported ornamental fish be quarantined. Between October 2020 and July 2024, 776 ornamental fish comprising 38 species from 14 families were received either from Indonesia (IN), Sri Lanka (SL), and Thailand (TH) using an established trading company. Standard procedures were applied when transporting, handling, and dissecting fish, including the examination, fixation, and preservation of parasites. Of the fish examined, 16 species (42%) were infected by parasites comprising five parasitic groups *i.e.,* Ciliate, Monopisthocotyla, Cestoda, Nematoda, and Crustacea, represented by 31 species and 21 genera. The monopisthocotylans were the most prevalent, with a total of 18 species reported on fish imported from TH (82%) and SL (80%), while fish from Indonesia had a higher proportion of endoparasites (Nematoda and Cestoda, 20 and 27%, respectively). The fish examined were mostly infected by two species of parasites; however, the goldfish *Carassius auratus* was reported to be infected with five parasite species. Amongst the parasites identified, an invasive parasite species, *Schyzocotyle acheilognathi*, was found in *Cichlasoma* sp. (SL) and a new genus of monopisthocotylan parasite in *Glossolepis incisa* (IN). Species compositions differed when fish were sourced from two or more countries. The present study shows that the systematic screening for parasites from ornamental fish and the implementation of quarantine is essential to avoid the introduction of non-native parasites. This study was supported by the DSTI-NRF SARChI Chair (No.101054).

Non-invasive monitoring of adrenocortical and gonadal activity in male and female impala (*Aepyceros melampus*) across the pre-rut, rut and post-rut phases

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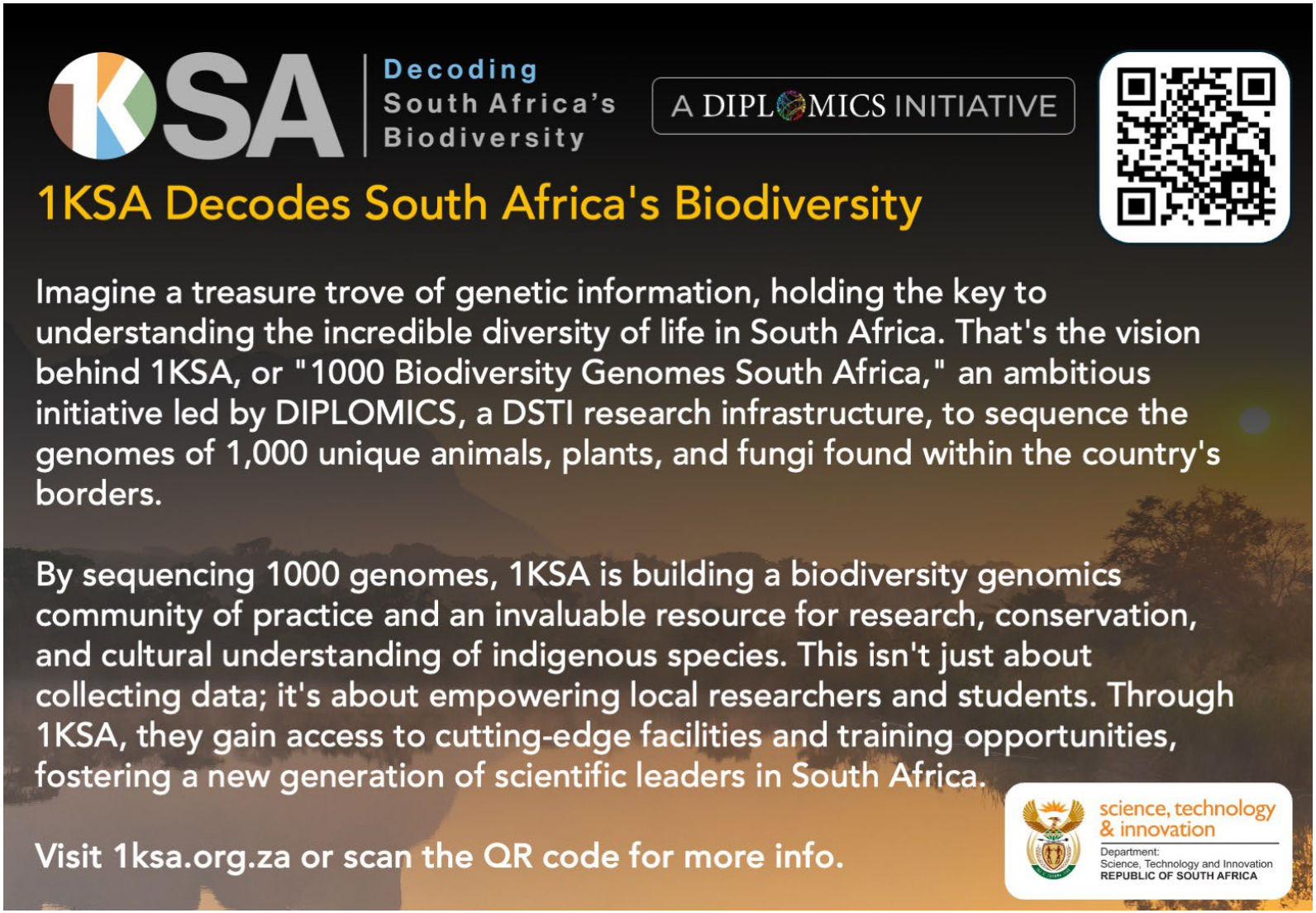
Seasonal reproduction is mediated by the endocrine system, which exerts its effects through the release of steroid hormones, such as androgens and glucocorticoids. Given that little is known about how steroid hormones change over the impala (*Aepyceros melampus*) reproductive season, this study aimed to assess patterns of faecal androgen metabolite (fAM) and faecal glucocorticoid metabolite (fGCM) concentrations of male and female impala over the phases of the rut. Faecal samples were collected from male and female impala to quantify and compare the respective hormone metabolite concentrations between males of different age classes and social ranks, the phases of the rut and across the two different sections of the Telperion Nature Reserve (TNR). Age class and social rank markedly affected the respective steroid hormone concentrations. Both fAM and fGCM concentrations varied significantly within the impala population during the different phases of the rut. These variations were influenced by rut-associated social interactions (both male-female and male-male) and resource availability specific to each reserve section. This study revealed the endocrine adaptations of impala to reproduction-related challenges, which enabled them to optimise their chances of successful mating and overall reproductive success. This information is essential for the effective management of impala populations. As a keystone species, impala play significant ecological roles, making their long-term sustainability vital not only for ecological balance but also for preserving biodiversity.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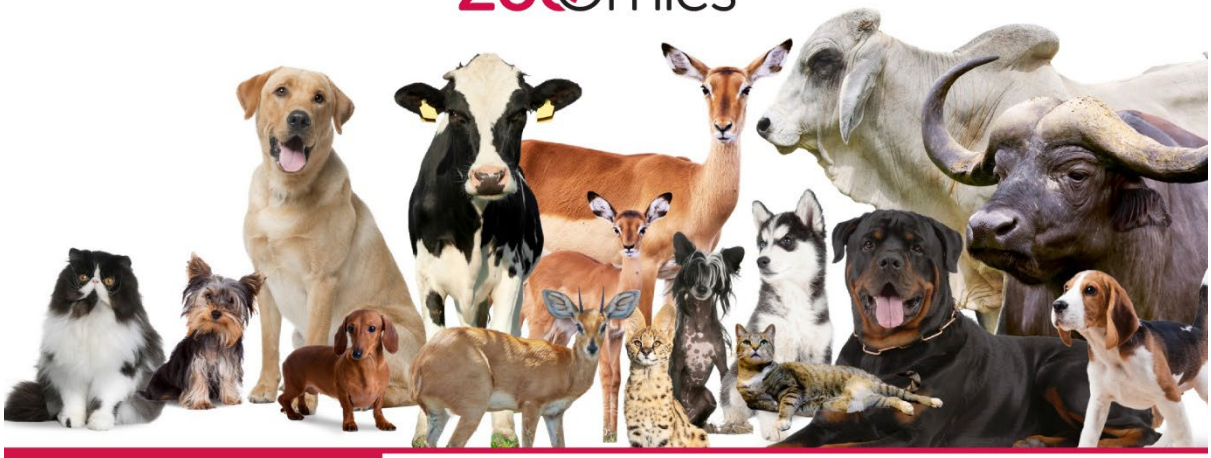

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