

### BIOL6051 research project briefs for 2019-20 entry

Indicative costs are provided as 3 cost bands (actual costs may vary, depending on choices made by the student, however the 3 bands provide guidance based on the research project experience of the programme team):

A = £1,700.00

B = £2,600.00

C = £4,200.00

#### Assessing holistic grazing as an effective management strategy in African savannahs

Location: Kenya, Cost band: C



The challenge of conserving wildlife within a functioning grassland ecosystem, while maintaining economic and cultural security for local community grazers, is a global problem. In Kenya, holistic grazing management, a method developed by Alan Savory for these complex systems, has been widely employed within wildlife conservancies with the aim of achieving a sustainable and balanced grazing system. Understanding the baseline response of botanical communities to herbivory under these regimes will begin to indicate how effective introduced plans have been to meet broader conservation aims. Using a suite of field techniques to gather experimental data on the grazing impact, the candidate will need to be able to be solution-conscious, able to adapt to challenging situations in the field and often working in small groups. The study forms part of a broader piece of research which will model the ecological response of global grasslands to human pressure.

**Examining ecosystem resilience by determining the functional response of below-ground invertebrates to a grazing pressure gradient**

Location: UK; Cost band: A



Among complex grassland systems in the UK, conservation grazing is adopted as a solution to maintaining and enhancing local biodiversity. Grazing can be employed at varying densities, having differing impacts on wildlife communities and the subsequent recovery of the ecosystem. The role that invertebrates play in maintaining ecosystem functioning in response to grazing pressure is important because of the diverse functions they have for ecosystem productivity. In unimproved grasslands increased abundance and diversity of insect communities supports the concept that these systems are resilient to environmental change, but grazing may become detrimental if not managed at the right level. This study explores the functional diversity of below-ground invertebrates in response to human pressure. The study forms part of a broader piece of research which will model the ecological response of global grasslands to human pressure.

## Assessing the change to ecosystem services as a result of conservation management in northern Kenya

Location: Kenya; Cost band: C



The human pressure exerted on fragile grasslands can often be detrimental to ecosystem function, to wildlife populations and also for the human-well being of the communities living within these areas. Conservation management is a fundamental part of the cultural and economic security of these often remote areas, and protected area management aims to ensure longevity and availability of resources for humans and wildlife. In northern Kenya, community-conservancies have been established to find a balance between often conflicting requirements of people and wildlife. Quantifying the change to the value of ecosystem services as a result of a site-based management intervention is integral to determining the ecological impact to wildlife and people. An assessment can also help anticipate the change going forward into the under shifting human pressures. The study uses the TESSA toolkit (developed at Cambridge University by Dr Kelvin Peh and colleagues) to assess the changes to ecosystem services and quantify the biological impacts. The candidate should be adaptable, field-prepared and solution-conscious, able to work in sometimes challenging environments. The study forms part of a broader piece of research which will model the ecological response of global grasslands to human pressure.

Do personality traits of captive reptiles translate into valuable attributes for reintroduced individuals?

Location: UK; Cost band: A



Expanding on our research exploring the personality traits of our captive sand lizard *Lacerta agilis* population, there is a need to understand how these personality traits, through behavioural profiles, translate for reintroduced individuals released to our receptor sites. Without concurrent evaluation, captive breeding may unintentionally be selecting traits that are ill-suited for wild reintroductions. The research continues the post-release monitoring of this rare lizard at our heathland site of Eelmoor Marsh SSSI, and will support the selection protocol of juvenile lizards for wider release under the Sand Lizard Reintroduction Strategy. Do captive populations adapt to their *ex situ* environment and do these traits translate for reintroduced animals post-release? Further questions around the longevity of these behavioural traits and plasticity of these animals could also be developed.

The evolution of life-history traits in captive scimitar-horned oryx populations (changes in captivity)

Location: UK; Cost band: A



The scimitar-horned oryx is an 'extinct in the wild' aridland antelope that is reliant on an integrated strategy of captive breeding and reintroduction for its continued survival. The species has been reintroduced to Tunisia, Senegal, Morocco and Chad utilising the European Ex-situ Population (EEP) as a source of animals for release. Over generations in captivity, we have observed genetic and morphological changes in the European population, and will now investigate if there are corresponding changes in life-history traits that may impact on the success of reintroduction projects. This desk-based project will utilise existing data sets to model changes in captivity for this flagship species, with the aim of improving the success of ungulate reintroduction projects.

## Identifying candidate species for reintroductions using habitat approaches

Location: UK; Cost band: A



Candidate species for reintroduction are often selected on an arbitrary basis, or using historical records for a particular site. This project aims to evaluate the efficacy of different approaches for identifying candidate species for reintroduction using comparable methods, particularly in light of climate-change predictions. This predominantly desk-based project will utilise some existing data sets, but will require additional data collection. The results of this project will enhance the field of reintroduction biology and help guide future reintroduction efforts.

## Effectiveness of post-release monitoring strategies for *Partula* snails

Location: UK; Cost band: A



Many species of Polynesian tree snail (*Partula* spp.) are extinct in the wild, and reintroductions to French Polynesia have taken place over a number of years. However, the post-release monitoring of such a cryptic species remains one of the major challenges in evaluating the success of reintroduction efforts. This project will utilise the planned 'release' of Polynesian tree snails into the 'Energy for Life' tropical house at Marwell Zoo, and will evaluate the efficacy of different post-release monitoring approaches. The project will involve the handling of snails and will require substantial periods of data collection in both a laboratory environment and the tropical house. The results of this project will inform future reintroductions of *Partula* snails, in particular, the post-release monitoring and evaluation of reintroduction success.

Evolution of behaviour in captive *Partula* snails

Location: UK; Cost band: A



Polynesian tree snails (*Partula* spp.) are highly threatened in the wild, and are maintained in a captive breeding programme. Some species have now been reintroduced to French Polynesia with more releases planned for the future. It is therefore important, that these captive populations retain key behaviours that will enable them to survive in the wild. This project aims to evaluate the behaviour of captive tree snails in a laboratory setting, providing us with key insights into the evolution of behaviour in captivity and the possible impacts on reintroduction success.

Regional metapopulation management strategies for aridland herbivores in Northern Africa in relation to predicted climate change

Location: UK; Cost band: A



Populations of aridland herbivores, in particular antelope, gazelle and ostrich populations, in Northern Africa are fragmented across a human dominated landscape. These isolated populations are not individually sustainable, and may even be unsustainable when viewed as a metapopulation within an individual country. This desk-based project aims to evaluate the efficacy of regional metapopulation management strategies for large herbivores in Northern Africa under varying climate change and socio-economic scenarios. The results of this will guide future conservation strategies and action within the region.

## The impact of protected area management on aridland habitat and biodiversity in Tunisia

Location: Tunisia; Cost band: B



Tunisian protected areas have undergone substantial habitat restoration to prepare them for the reintroduction of aridland herbivores. These reintroduction efforts have been completed and we are now in an extensive post-release monitoring phase. This includes large-scale habitat evaluation to assess the impact of reintroductions on aridland biodiversity. This project will evaluate the habitats inside and outside of protected areas in Tunisia and will require substantial fieldwork to collect data in an aridland environment, as well as utilising data from previous surveys. The results of this research will enable us to draw conclusions on the wider impact of aridland herbivore reintroductions and will inform future reintroduction and habitat restoration efforts.

## Grevy's zebra metapopulation

Location: UK; Cost band: A



The endangered Grevy's zebra (*Equus grevyi*) formerly ranged across the arid regions of northern Kenya, southern Ethiopia and South Sudan. Hunting, competition with livestock and dramatic ecosystem degradation due to human activities and climate change resulted in substantial declines in the Grey's zebra population over the 20th century. With a total population of approximately 2,000 individuals, the Grevy's zebra is now fragmented across what remains of its former range. Understanding the limits to movement between sub-populations and the consequential risk for small and isolated fragments, this desk-based project will use existing dispersal, population and movement data to evaluate the viability of Grevy's zebra populations in Northern Kenya. It is hoped that this research will also explore various scenarios in the region to provide policy-relevant information on the plausible future options for the species.

## Grevy's Zebra social behaviour as a determinant of energetic intake

Location: Kenya; Cost band: C



The endangered Grevy's zebra (*Equus grevyi*) formerly ranged across the arid regions of northern Kenya, southern Ethiopia and South Sudan. Hunting, competition with livestock and dramatic ecosystem degradation due to human activities and climate change resulted in substantial declines in the Grey's zebra population over the 20th century. With a total population of approximately 2,000 individuals, the Grevy's zebra is now fragmented across what remains of its former range. As a social species, the composition of herds in these fragmented populations will have an impact on survival, either through breeding or foraging. Behavioural changes in response to population changes and consequential network dynamics might therefore be anticipated. The research will explore the impact of social behaviours on individual foraging in Grevy's zebra herds. Developing social interaction matrices, these will be applied to individual rates of intake and foraging success relative to availability and distribution of resources. The results of this research will provide insights into anticipated changes as populations become more fragmented and prioritise actions in areas of concern.

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| Evaluation of policy and practice for transboundary conservation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Location: UK; Cost band: A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| <p>The increasing problems of habitat and species fragmentation require wider coordinated actions to deliver conservation success. Many large-bodied species occur over more than one country, yet collaborations are often difficult to achieve. Notable successes include the snow leopard, with international conservation actions defined under the Global Snow Leopard and Ecosystem Protection Program (GSLEP). However, it can be difficult to translate higher level good intentions into practical outcomes on the ground. This project will identify priority species and regions where transboundary conservation could be developed to delivery conservation gains. Approaches will include spatial modelling of species, ecosystems and socio-economic indicators to develop a suite of holistic models that can be generalised to other contexts as a transboundary conservation toolkit.</p> |



Habitat suitability and connectivity for common dormouse (*Muscardinus avellanarius*) reintroductions in southern England

Location: UK; Cost band: A



The common dormouse is a priority species under the UK Biodiversity Action Plan, following substantial declines in Britain since the 1950s. Loss and fragmentation of ancient woodlands, climatic variability and changes to woodland management practices are all implicated as reasons for this decline. Dormice require diverse mixed woodland habitats, which can be created using sensitive management. Connectivity between populations is essential, but often difficult to achieve over large areas to permit the movements of dormice, because the animals live almost exclusively in trees. Reintroductions of dormice have been undertaken, but require suitable areas of habitat and often long periods of supplementary feeding. This project will seek to model habitat suitability and connectivity in southern England to identify hotspots for potential future reintroductions of dormice. The results of this research will contribute to conservation and reintroduction planning for the species.