

## NEWS

### Trinity BioBlitz

The first ever Trinity Campus Bioblitz took place on the 22nd of May with an enthusiastic turn out from both staff and students. The MSc. Biodiversity and Conservation class efficiently organised the event on behalf of the TCBR and we would like to thank them all for their time and effort. The aim of the BioBlitz was to record as many different types of species found in the Campus, taking note of their location and abundance. An important and useful recording approach to monitor species diversity.



MSc Biodiversity and Conservation class with Èanna Ní Lamhna at BioBlitz launch (Courtesy: Ainhoa González).

Trinity BioBlitz was launched in the main square by Èanna Ní Lamhna, one of Ireland's much recognised and loved wildlife presenters and environmental educators. The Campus was explored and investigated by teams of keen wildlife recorders who were led by experts in botany, zoology and general ecology. The Luce Hall became a hub of activity as species were identified and recorded. A range of species were recorded from aquatic pond-life to common insects. Mammals were not forgotten either with an urban fox spotted running through campus.



BioBlitz recording in action (Courtesy: A. González).

The BioBlitz was the first ever held on Campus and provided a wonderful insight into its range of biodiversity. The total

species recorded are currently being inventoried. They will be made available in the TCBR website and submitted to the National Biodiversity Data Centre.

### BioBlitz 2013

The annual national BioBlitz, organised by the National Biodiversity Data Centre, brought 170 naturalists together to survey 5 sites (Wicklow Mountains National Park, Burren National Park, Lough Key Forest Park, Colebrooke Estate and Phoenix Park) to record wildlife species over a 24 hour period. For more information, visit <http://www.biodiversityireland.ie/irelands-bioblitz-2013/>.

### TCD is awarded a Green Flag by An Taisce

On April 8th 2013, TCD was awarded a "Green Flag" for the quality of its environment, as part of An Taisce's Green-Campus programme. The award is the result of many years of work by students and staff to improve the environmental management and sustainability of the Campus. It is an international award that recognises efforts to meet a range of objectives and targets in nine key areas, and is a wonderful achievement for our College. Research and activities relating to biodiversity are an integral part of being a Green Flag campus. For more details, see the Green Pages: [www.tcd.ie/GreenPages](http://www.tcd.ie/GreenPages).



Gwen Duffy, Environmental and Ethical Trading Officer, final year Environmental Sciences Student.

### Successful PhD

Congratulations to Christina Campbell on completing her PhD on 'Conservation of selected legally protected and Red Listed bryophyte species in Ireland' and to Jesko Zimmerman on completing his PhD on 'Soil carbon sequestration during the establishment-phase of *Miscanthus x giganteus* - a study on three spatial scales'.

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**TCBR Intern**

Sara Gomes, a Portuguese anthropologist is TCBR's intern for the next 4 months. She specialises in the area of nature and conservation from a social science perspective.

Sara is currently developing a questionnaire to gather public perceptions on the subjective values assigned to the natural areas according to the uses they provide. The objective is to obtain a general view from international visitors and local inhabitants from both urban and rural areas as to the cultural value of land use types and, with that information, produce a national spatial map of valued land uses. She is also assisting the TCBR team with other administrative and research tasks.



**Update on the Biodiversity Beermats**

Following on from the successful launch of their innovative project last August, the BiodiversityInOurLives group (comprised of TCBR PhD students) has printed another batch of their biodiversity beermats. The colourful beermats provide fun facts about biodiversity with topics ranging from tippy elephants to the bees that make cider possible.

The group has recently distributed the beermats to dozens of additional pubs, and are currently running a contest in which they're encouraging pub-goers to post a photo of themselves with one of the beermats to their Facebook page ([facebook.com/biodiversityinourlives](http://facebook.com/biodiversityinourlives)) to win a prize.



Sample beermats (Courtesy: BiodiversityInOurLives).

**BRIDGE: Linking Science and Policy**

A significant amount of time, money and intellectual effort is spent each year in Ireland on environmental science research. However, integrating the results of this research into policies which will protect people and planet can be challenging. Part of the problem is that policy makers, scientists and other interested stakeholders often find it difficult to connect and

understand one other. It is as if they are speaking different languages. Bridging the communication gap between researchers and policy makers in Ireland is the subject of BRIDGE, an project funded by the EPA Strive programme and led by TCBR members Prof Anna Davies and Dr Joanne Rourke in Geography, School of Natural Sciences, TCD.

The BRIDGE project focuses on three core environmental policy areas: biodiversity, climate change and water quality and management. These sectors have been identified by government, as well as economic and environmental organisations, as being key to Ireland's sustainability strategy. The aim of the BRIDGE project is to produce a science-policy communication toolkit that will improve communication between scientists, policy makers and other stakeholders involved in environmental policy discussions.

The toolkit design is grounded in the essential elements of good science-policy practice such as two-way communication, networking and knowledge-brokering, where intermediaries act as translators of knowledge and facilitators of communication.

An interesting aspect of this project is that the toolkit is being co-produced by those who will eventually use it. The project used a workshop to explore the communication difficulties, needs and views of leading researchers, policy makers and intermediaries such as ENGOs and environmental journalists. This information is currently directing the design of the toolkit. A second workshop, due to be held in mid-June will allow the various stakeholders to test and fine tune the toolkit so that the completed toolkit can be tailored specifically for the stakeholders who will use it and for the three key sectors.

For further information on this project, please contact Dr Joanne Rourke at: [jrouрке@tcd.ie](mailto:jrouрке@tcd.ie) or on 087 6868649.

**Irish Plant Scientists' Association Meeting**

Several TCBR PhD students presented work at the annual Irish Plant Scientists' Association Meeting, NUI Galway, 16-17th May, 2013. Congratulations to Paul Egan for achieving the Best Speaker Prize on day one for his outstanding presentation on 'Variation of nectar toxicity in space, time and habitat – is there evidence for functional significance?'. Presentations by TCBR students included:

- 1) Patricia Coughlan, James Carolan, Ingrid Hook & Trevor Hodkinson: The phylogenetics of paclitaxel biosynthesis genes in *Taxus baccata*, *Taxus* hybrids and allies. (Poster)

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2) Paul Egan, Erin Jo Tiedeken, Phil Stevenson, Geraldine Wright, Fabio Boylan, Jane Stout. Variation of nectar toxicity in space, time and habitat – is there evidence for functional significance? (Talk)




3) Brian McGuinness, Trevor Hodkinson, Helen Grogan: Variable resistance in Escallonia plants to a leaf spot disease caused by a newly discovered species of Septoria. (Poster)

4) Brian Murphy: Fungal infection in barley roots – friend and foe. (Talk)

5) Aidan Walsh, John Finn, Mathew Jebb, Steve Waldren, Caroline Sullivan: Analysis of plant distribution data in Ireland supports conservation in the wider countryside beyond protected areas. (Talk)

**Workshop on Invasive Species and Roads**

Halting the loss of biodiversity and ecosystem services remains a key challenge of the 21st century. Invasive species are now recognised as one of the greatest threats to biodiversity globally and in Ireland. The SIMBIOSYS Project contributed to addressing this challenge by studying the impacts of road developments on alien species invasion and resistance. 

As part of the dissemination of the SIMBIOSYS research results, TCBR members Dr David Bourke, Dr Jane Stout and Dr Nova Sharkey, in conjunction with colleagues in UCC Dr Pádraig Whelan and Ros Thompson, organised an Invasive Species & Roads workshop on May 23rd in the Botany, School of Natural Sciences, TCD.



Eight invited national and international experts and SIMBIOSYS researchers delivered a series of presentations to an audience of over 60 participants from local authorities, the construction, landscaping and horticultural sectors, the

scientific research community, relevant decision makers, and the interested public. The workshop successfully:

- Provided an overview of invasive plants and their ecology.
- Provided an overview of national and international legislation, policy and guidelines concerning the management of invasive alien plants on roads.
- Disseminated outputs from recent research activities on the impact of roads on biodiversity and ecosystem services
- Demonstrated with practical examples perspectives on invasive plant management through biological, physical and chemical control.

A plenary discussion at the end of the workshops facilitated discussion among key stakeholders in the road development and conservation sectors, identifying priority issues for future research and best practice in invasive species control and eradication implementation.

For more information on the outcomes of the workshop, please visit the SIMBIOSYS website (<http://www.tcd.ie/research/simbiosys/>) where copies of the presentations can be found, along with a synopsis of key messages and recommendations arising from the discussions.

**COST HarmBio Workshop**

Global biodiversity is declining rapidly, largely as a result of human activities. Effective policy and adaptive management strategies in the face of global change require anticipation of future changes. Mid- to long-term planning will therefore depend, at least in part, on model-based projections.



To this end, an international workshop was organised by TCBR member Dr David Bourke in TCD between May 13th and 15th 2013 to facilitate discussions on the harmonization of current models and datasets of terrestrial, freshwater and marine biodiversity to improve the reliability of future projections of biodiversity change.

Forty biodiversity scientists from 18 European countries, the US and New Zealand came together in Dublin as part of an EU COST funded action called HarmBio (Harmonizing Global Biodiversity Modelling; <http://www.harmbio.eu/>). This interdisciplinary initiative aims to accelerate the development of transparent and scientifically robust biodiversity models, through validation, calibration and intercomparison of models



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and data, to enable environmental decision making based on state-of-the-art projections of biodiversity change under various policy options. Ultimately, the aim is to provide robust tools to decision makers, including national governments, the European Commission, and in particular the recently established Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES; <http://www.ipbes.net/>).

Significant scientific progress was made over the three days in TCD by the HarmBio Working Groups which focused on the following themes:

1. Consensus on metrics of biodiversity;
2. Standardised datasets of biodiversity and environment;
3. Agreed standards for biodiversity models; and,
4. Inter-comparison of biodiversity models.

Meeting outcomes focused on action plans for the coming 12 months including reviews of biodiversity modelling literature and evaluations of commonly used modelling techniques and datasets. The next HarmBio workshop is planned for Lisbon, Portugal in 2014.

**IUCN Red List Species Workshop**

A seminar was delivered by Dr Ed Barrows – IUCN Red List of Ecosystems: An evolving tool for risk assessment, priority setting and landscape action, on Friday the 17th of May. Dr Ed Barrows is a former graduate of Trinity’s Zoology Department and is currently the Head of Ecosystems at the IUCN. The focus of his talk was to introduce the new risk assessment criteria developed by the IUCN to assess ecosystems. This will ultimately provide the world with a Red List for Ecosystems. This was the first time the concept of a standard global assessment of risks for entire ecosystems or “higher levels of biodiversity” has been introduced. The seminar was attended by a great mix of people, from permanent Trinity staff, post docs, master’s students, undergraduates and members of various NGO’s.



Peatland ecosystems (Courtesy: Caoimhe Muldoon).

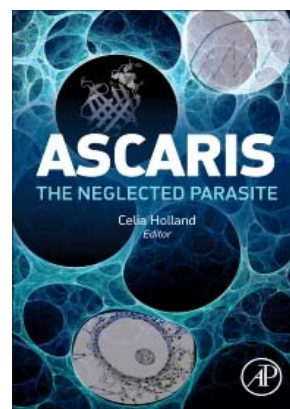
The seminar provided a great introduction into the new ecosystem assessment tool developed by the IUCN. Ed went to the process behind the model and the need for such a tool. Incorporated in the model was the interesting concept that of ecosystem collapse. When does an ecosystem go beyond recovery and change into something else. Following this, Ed hosted a two hour workshop to give some practical experience of applying the model and carrying out a risk assessment on an Irish ecosystem.

The model uses four distributional and functional symptoms to assess ecosystem risk. Ed explained that the process of evaluating a habitat would normally take over four months and extensive amount of backing data. Participants then proceeded to assess one of the most politically sensitive habitats in Ireland: Peatlands. A lively debate ensued when results were presented.

**RECENT PUBLICATIONS**

**Books**

**Holland, CV** (Editor) (2013). *Ascaris the neglected parasite*. pp464 Elsevier.



This book tackles a number of different perspectives concerning the parasitic helminth *Ascaris*, both in animals and in humans and the disease known as ascariasis. It seeks to identify interesting, exciting and novel aspects, which will interest readers from a broad range of disciplines.

Over a quarter of the world's population are infected with the human roundworm, and the equivalent in pigs is equally ubiquitous. Both contribute to insidious and chronic nutritional morbidity, and this has been quantified, in humans, as disability adjusted life years approximating 10.5 million. *Ascaris* larvae develop in host parenteral tissues, and the resultant pathology has been condemnation. Ascariasis, despite its staggering global prevalence and the sheer numbers of people it infects, remains a classic neglected disease. However, renewed interest in the consequences of early infection with worms from the perspective of immune modulation, co-infections and the development of allergy further enhances the relevance of these parasites.

RECENT PUBLICATIONS

Journal Articles

Christin PA, Osborne CP, Chatelet DS, Columbus JT, Besnard G, **Hodkinson TR**, Garrison LM, Vorontsova MS, Edwards EJ (2013) Anatomical enablers and the evolution of C4 photosynthesis in grasses. *Proceedings of the National Academy of Sciences USA*, 110: 1381-1386.

**Gill LW**, Naughton O, Johnston PM (2013) Modelling a network of turloughs in lowland karst. *Water Resources Research*, DOI: 10.1002/wrcr.20299.

O'Brien RJ, Misstear BDR, **Gill LW**, Deakin J (2013) Applying an integrated hydrograph separation and lumped modelling approach to quantifying flow pathways in Irish river catchments, *Journal of Hydrology*, 486: p259-270.

**Parnell J** (2013) The biogeography of the Isthmus of Kra region: a review. *Nordic Journal of Botany*, 31: 1-15.

Power EF, **Kelly DL**, **Stout JC** (2013) The impacts of traditional and novel herbicide application methods on target plants, non-target plants and production in intensive grasslands. *Weed Research*, 53: 131-139.

Santisuk T, Larsen K, **Newman M**, Chayamarit K, Balslev H, Phengkhilai C, Pedersen H, **Parnell J**, Middleton D, Newman M, Simpson DA, van Welzen PC, Esser H-J, Hul S, Kato M (2013) *Flora of Thailand* 11(3), Bangkok, The Forest Herbarium, Department of National Parks, Wildlife and Plant Conservation, 323-498.

**Stanley DA**, Knight ME, **Stout JC** (2013) Ecological Variation in Response to Mass-Flowering Oilseed Rape and Surrounding Landscape Composition by Members of a Cryptic Bumblebee Complex. *PLoS ONE*, 8(6): e65516.

**Stanley DA**, **Stout JC** (2013) Quantifying the impacts of bioenergy crops on pollinating insect abundance and diversity: a field scale evaluation reveals taxon-specific responses. *Journal of Applied Ecology*, 50: 335-344.

Thomasset M, Fernández-Manjarrés JF, Douglas GC, Bertolino P, Frascaria-Lacoste N, **Hodkinson TR** (2013) Assignment testing reveals multiple introduced source populations including potential ash hybrids (*Fraxinus excelsior* x *F. angustifolia*) in Ireland. *European Journal of Forest Research*, 132: 195 - 209.

Ugoletti P, Reidy D, **Jones, MB**, **Stout JC** (2013) Do native bees have the potential to promote interspecific pollination in introduced *Impatiens* species? *Journal of Pollination Ecology*, 11: 1-8.

OPPORTUNITIES

PhD Studentship on Plant Diversity

Applications are sought from suitably qualified candidates to undertake doctoral research on any aspect of plant taxonomy, plant diversity and the factors that govern this diversity. The project will be funded through the D.A. Webb studentship which was established in memory of Professor David Webb. The studentship will include EU fees and an annual stipend of €16,000 for three years as well as a modest fund to support travel and laboratory costs. The project will commence in September 2013 and the student will be based at the Botany Department in TCD; information on the department can be found at [www.tcd.ie/Botany/](http://www.tcd.ie/Botany/)

Potential candidates should first make contact with a potential supervisor in the Botany Department [www.tcd.ie/Botany/staff/](http://www.tcd.ie/Botany/staff/). The application should include an outline of the proposed research (500 words max) and the name of the proposed supervisor, and be submitted with a curriculum vitae which includes contact details for two referees. Deadline for applications is Monday 1st July 2013. Completed applications should be submitted to Professor Fraser Mitchell, Botany Dept., TCD, at [fraser.mitchell@tcd.ie](mailto:fraser.mitchell@tcd.ie).

PhD Scholarship in Biodiversity & Conservation

Applications are sought from suitably qualified candidates to undertake doctoral research on any aspect of biological diversity and its conservation; interdisciplinary studies are particularly welcome. The project will be funded through a TCBR studentship, which will include EU fees and an annual stipend of €16,000 for three years as well as a modest fund to support travel and laboratory costs. The project should reflect the research goals of the TCBR, and will commence in September 2013. The successful applicant will be registered in the School of Natural Sciences and linked with the TCBR. Applicants must NOT have started their research at the time of application. Information on the School can be found at <http://www.naturalscience.tcd.ie/>, and on the TCBR at <http://www.tcd.ie/tcbr/>.

Potential candidates should first make contact with a potential supervisor(s) in the School, see <http://www.naturalscience.tcd.ie/>, and follow links for further information on staff research interests. Applications must be submitted on the application form. Deadline for applications is Monday 15th July 2013. Completed applications should be submitted to the School of Natural Science, Trinity College, Dublin 2, at [snsmast@tcd.ie](mailto:snsmast@tcd.ie).

## RESEARCH FOCUS

**Ecological variation in response to mass-flowering oilseed rape and surrounding landscape composition by members of a cryptic bumblebee complex** by Dara A. Stanley, Mairi E. Knight, Jane C. Stout

The *Bombus sensu stricto* species complex is a widespread group of cryptic bumblebee species which are important pollinators of many crops and wild plants. These cryptic species have, until now, largely been grouped together in ecological studies, and so little is known about their individual colony densities, foraging ranges or habitat requirements, which can be influenced by land use at a landscape scale. We used mass-flowering oilseed rape fields as locations to sample bees of this complex, as well as the second most common visitor to oilseed rape *B. lapidarius*, and molecular RFLP methods to distinguish between the cryptic species. We then used microsatellite genotyping to identify sisters and estimate colony densities, and related both proportions of cryptic species and their colony densities to the composition of the landscape surrounding the fields (see publications above: Stanley *et al.*, 2013).



*Bombus terrestris*  
foraging on oilseed  
rape (Courtesy: Jane  
Stout)

We found *B. lucorum* was the most common member of the complex present in oilseed rape followed by *B. terrestris*. *B. cryptarum* was also present in all but one site, with higher proportions found in the east of the study area. High numbers of bumblebee colonies were estimated to be using oilseed rape fields as a forage resource, with *B. terrestris* colony numbers higher than previous estimates from non-mass-flowering fields. We also found that the cryptic species responded differently to surrounding landscape composition: both relative proportions of *B. cryptarum* in samples and colony densities of *B. lucorum* were negatively associated with the amount of arable land in the landscape, while proportions and colony densities of other species did not respond to landscape variables at the scale measured. This suggests that the cryptic species have different ecological requirements (which may be scale-dependent) and that oilseed rape can be an important forage resource for many colonies of bumblebees. Given this, we recommend sustainable management of this crop to benefit bumblebees.

**Impacts of organic and conventional dairy farmer attitude, behaviour and knowledge on farm biodiversity in Ireland** by Eileen F. Power, Daniel L. Kelly, Jane C. Stout

Agricultural intensification has caused significant declines in biodiversity. Agri-environmental schemes (AES), including organic farming, are thought to benefit biodiversity. However, under similar production conditions and in comparable locations and schemes, farms are not managed in the same way, with variable consequences for production and the environment. Understanding farmer attitude, behaviour and knowledge of the environment and impacts on biodiversity may help understand variable impacts of AES on biodiversity.

Irish dairy pasture  
(Courtesy: Eileen Power)



We combined a sociological survey of nine organic and eight conventional dairy farmers (measuring environmental and achievement attitudes; environmental and production-orientated behaviours and environmental knowledge), in Ireland, with a biodiversity (using plant richness as an indicator) assessment of their farms. We found higher plant richness on organic farms than conventional. Organic and conventional farmers had similar attitudes to farming achievement and the environment but organic farmers were better informed about environmental issues and carried out more environmentally orientated behaviours.

Biodiversity was positively related to the amount of environmentally orientated behaviours. Organic farmers who had more positive attitudes to the environment and were better informed about it had higher biodiversity on their farms compared to less positively inclined, less informed organic farmers. We show disparities between attitude and actual behaviour in relation to the environment, with organic farmers sharing similar attitudes to conventional farmers, but more prepared to inform themselves about and carry out environmentally friendly farming. Results indicate that organic farming and environmentally orientated behaviours benefit biodiversity. We encourage conservation orientated thinking and better environmental education among farmers, including those who already participate in an AES, to maximise the benefits of the AES for the environment. See: <http://www.sciencedirect.com/science/article/pii/S1617138113000204>

## RESEARCH FOCUS

**Effects of Roads on Habitat Diversity by Nova Sharkey**

The motorway network in Ireland has grown considerably over the past number of years. From 2004 to 2010, the length of motorway increased from 191.7km (3.5% of the road network) to 900.3km (16.6% of the network). While roads can have detrimental effects on landscape ecology (e.g. habitat loss, fragmentation), the landscaping of roadside verges can mitigate against these damages by increasing connectivity and providing refuges and corridors for native biota. A study carried out as part of the SIMBIOSYS project by TCBR members Dr Nova Sharkey and Dr David Bourke who investigated the impacts of motorway construction and landscaping on landscape ecology at 25 sites located along five new stretches of motorway, using georeferenced aerial photographs from before and after motorway construction.

Habitat diversity was found to be significantly higher post-construction. This was partly due to the addition of attenuation ponds and roadside verges to the landscape, both of which can have positive effects on biodiversity. Attenuation ponds, which are used to contain stormwater and pollutant runoff from motorways, were found at 22 of the 25 sites, and have been shown to contribute to the biodiversity of aquatic invertebrates and amphibians at a local scale, as well as increasing connectivity with existing ponds. Recent decades have seen the loss of many farmland ponds, and these results highlight the contribution to biodiversity conservation that road landscaping can have to the wider landscape.



A digitised landscape from the M7, before (a) and after (b) motorway construction. The Shannon Diversity Index of the landscape increased from 1.003 to 1.387 after the motorway was built, in part due to road landscaping treatments such as roadside verges (V) and attenuation ponds (AP).

Courtesy: Nova Sharkey.

**Woodland biodiversity and interaction with large herbivores by Miles Newman**

Woodlands are a globally important ecosystem, covering approximately 25% of the earth's land area and supporting the majority of terrestrial biodiversity. The functioning of temperate woodlands is being impacted through a range of anthropogenically induced vegetation changes. In addition, large wild herbivores, such as deer, have been increasing their range globally in recent decades and are now considered to be at unsustainably high levels in temperate woodlands. This has been shown to drive change in an ecosystem with cascading effects on a range of biotic and abiotic components such as invertebrates, birds, small mammals, vegetation, soil, terrestrial carbon storage and ecosystem functioning. Impacts should not only be seen with negative connotation, as many impacts associated with large herbivores play vital roles in woodland survival. These include, the disturbance necessary for certain species of tree to regeneration and the maintenance of a heterogeneous landscape with habitats suitable for a wide range of taxa. Perceived large herbivore overabundance is mainly dealt with in two key ways, either through culling programmes to reduce numbers, or through exclusion by fencing to remove them completely.

At present no native large herbivores roam in Ireland, although historic animal remains identify a long history of their presence with a reintroduction by humans after the ice age. Several deer species (red, sika, fallow, muntjac) and feral goats are increasing their range and roaming wild in many areas. Cattle and sheep, also contribute to woodland grazing and browsing, but their numbers have dramatically decreased in the last two decades. The impact large herbivores are having on Irish woodlands, and the development of management solutions for promoting biodiversity, form the basis of my recently completed PhD, carried out under the PLANFORBIO programme.

The project utilised an existing network of long-term fenced exclosures and paired controls located within three National Parks, ranging in age from 0 to 41 years old. This three year study has shown that grazing levels affect the plant abundance, species richness, vertical structure, and tree regeneration in a variety of ways, which are highly dependent on the intensity of grazing present. A homogenisation in the plant community was also found, with increasing time since the fenced exclosures were established. A collaborative multi-taxonomic part of the project, conducted with researchers at



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UCC, looked at the interactions among birds, ground spiders, and plants. It was found that the presence of large herbivore grazing can greatly alter surrogacy relationships among different taxa.

The research findings suggest that the next steps should focus on developing management objectives. If an area is being managed for increased tree regeneration, a lower large herbivore level is suitable, however, if overall increased plant diversity is desired, maintaining higher levels may be appropriate. The use of fencing to exclude large herbivore should only be considered on a short term basis (e.g. up to 15 years), as the vegetation community may be negatively impacted in the long-term.

**Reflections on the MSc Field Course to South Africa by Steve Waldren**

For the past four years the Biodiversity and Conservation MSc students have visited Limpopo Province in northern South Africa for their compulsory overseas field course. For me, this has proved a steep but very enjoyable learning curve; I had no experience of the bushveld habitat before taking the MSc class there in 2010. The large mammals are an obvious feature; Welgevonden, the main reserve we visit, is a ‘big five’ reserve, meaning lion, leopard, buffalo, elephant and white rhino. This means we spend much of our time in or close to vehicles, though we do get off vehicle to survey grassland and woodland habitats. But in many ways it’s the invertebrate diversity that is more striking, with a large variety of mantids, grasshoppers, beetles and Lepidoptera. The plant diversity is also tremendous even though we do not visit at a peak flowering period; our local guides often make the point that there are more species of trees growing in the grassland around camp than there are in Ireland.



Life was short for this African Monarch butterfly (*Danaus chrysippus*), captured soon after emergence by a mantid. The caterpillar had fed on the toxic milkweed *Asclepias aurea* and absorbed the toxic cardiac glycosides, the Monarch’s warning colours did not deter the mantid.

The other reserve we visit, Lapalala Wilderness, with black and white rhino, buffalo and leopard. At Lapalala we can get off vehicle a bit more, with walks to visit San rock art sites, and the hill above our ‘camp’ site – the camp in fact is an old tourist lodge now used by visiting researchers. In contrast to Welgevonden, Lapalala has almost no tourism, and the larger animals are far less habituated to vehicles. Both reserves are of similar size (around 37,000 ha), but managed in different ways; ecological considerations underpin the management of each, but differing financial approaches shape the types of management and interventions that can be achieved in each.

It is the ecological complexity which I find most interesting about these sites, with different patterns of primary production driving differing communities of herbivores (from elephant to termites) which in turn shape predator communities (from lion to ant-lion), all interacting with detritivores and decomposers to drive nutrient cycles that link back to primary production, particularly through grass species diversity. Add on top of this the conservation challenges of balancing predator and prey species – how many lions can the reserve support? – what is the impact of increasing elephant numbers and how can they be controlled? – or the complex issues surrounding rhino conservation, and its clear that our visit to South Africa provides students with an exceptional firsthand experience.



MSc students with Clive Walker (centre), artist, conservationist and educator, and the founder of the Lapalala Wilderness School which provides ecological education and training for South African school children. Clive’s work has done much to promote conservation of black and white rhino.

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