

NEWS

Top 10 new species to science

TCBR postgraduate researcher Paul Egan who recently discovered a new poppy to science, was rewarded for his finding when his poppy *Mecanopsis autumnalis* was awarded a place in the prestigious list of top 10 new species published annually by the International Institute for Species Exploration. This list both celebrates and emphasizes the importance of species exploration, the censusing of biodiversity, and the utilization of taxonomic skill.

Congratulations to Paul. This is truly a remarkable achievement as this striking flower blooms high in the Nepalese Himalayas in Nepal's monsoon season.



Photos courtesy of Paul Egan

You can enjoy the extraordinary treasures featured in this list at the following link: species.asu.edu/2012_species07

The Irish Integrated Biodiversity Impact Assessment Guidance has been published

As announced in previous TCBR Newsletters, the EPA funded research has been carried out by TCBR members Dr Ainhoa González and Professor Mike Jones in collaboration with University College Dublin and ecological consultants Scott Cawley Ltd. The Guidance presents a methodological approach for integrating key Appropriate Assessment (AA), SEA and EIA stages. It seeks to ensure that relevant processes required under different EU Directives and Irish national law connect effectively and efficiently, to provide an integrated and holistic approach to biodiversity impact assessment, optimise time and resource efficiencies, and avoid unnecessary duplication. Particular emphasis is given to the fulfilment of legal obligations, effective integration and communication of scientific knowledge; spatial assessment and biodiversity data considerations; and integration of biodiversity aspects with a variety of other environmental concerns during the planning process.

The Guidance is available for download from the following EPA links:

Final Report:

http://www.epa.ie/downloads/pubs/research/biodiversity/n_ame,33395,en.html

Executive Summary:

http://www.epa.ie/downloads/pubs/research/biodiversity/n_ame,33396,en.html

Professor Gretchen Daily, University of Stanford "Harmonizing People and Nature: A New Business Model"

Even in the face of intensifying pressures and risks on the global environmental front, there is a feeling of Renaissance in the conservation community. This flows from the promise in reaching, together with a much more diverse and powerful set of leaders than in the past, for new approaches that mainstream natural capital into decisions, and that explicitly link human and environmental well-being. Around the world, leaders are increasingly recognizing ecosystems as natural capital assets that supply life-support services of tremendous value and that merit protection and restoration. The challenge is to turn this recognition into incentives and institutions that will guide wise investments in natural capital on a large scale. Gretchen Daily will discuss the advances being made on three key fronts. Thursday 12 July 2012, 1-2pm Botany Lecture Theatre, TCD

Biodiversity & Conservation MSc South African field course

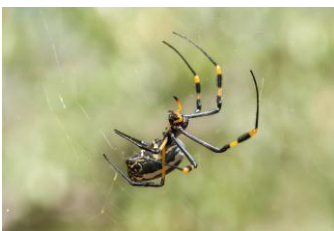
For the past three years the Biodiversity & Conservation MSc class has visited the Welgevonden Private Game Reserve in South Africa, obtaining firsthand experience of the challenges faced by conservation managers. Welgevonden is almost twice the area of our largest Irish national park, and was formed out of several farms but with appreciable areas of undisturbed bushveld habitat. Owned by a consortium of landowners, the reserve boasts the attraction of the 'Big Five' (Lion, Leopard, Elephant, Buffalo and White Rhino), but their effective management in functioning ecosystems presents considerable challenges. This year we also spent some time at the Lapalala Wilderness Reserve, which is of similar area to Welgevonden but under single ownership. Lapalala is more focused on conservation and education; it does not have Lion and Elephant, nor high numbers of tourists.

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Reserve management is therefore very different to Welgevonden, with a different set of challenges; the two reserves provided students with novel insights into the ecological effects of differing management prescriptions.



A Pyrgomorphid locust, likely from the genus *Phymateus*. These Milkweed Locusts feed on toxic members of the *Asclepiadaceae* and accumulate the toxins; these may be exuded in a foam to deter predators. Invertebrate diversity is high on the reserves but, despite the obvious ecological roles of invertebrates as predators, prey, grazers, pollinators and nutrient dispersers, they remain poorly understood.



A female Golden Orb-web Spider. These are large predators, with a leg span of about 10 cm. They build very large webs, up to 2 m across and constructed of extremely strong golden silk, often along game tracks. The males are far smaller than females and are at risk of predation by females.



Lion at a wildebeest kill, Welgevonden. While Lion are an undoubted tourist draw, the need to provide an appropriate balance between predators and prey species is a major management consideration, and has knock on impacts on all aspects of bushveld ecology (Photos courtesy of Dr. Steven Waldren)

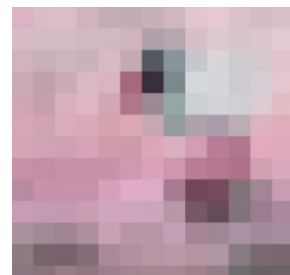
Biodiversity Marketing Group – Project Update

The Biodiversity Marketing Group has been working hard over the past few months on their pilot project, for which they were awarded funding in the *Small Changes, Big Difference* competition run by the TCD Alumni Office earlier this year. Their project involves the creation of beer mats

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of providing the general public information about biodiversity in an engaging way – and in an unexpected place! The beer mats will be distributed to pubs across Dublin, and the group hopes that they will serve to spark discussion on biodiversity around the table. They have had a lot of fun developing the concepts and facts for each of the four beer mats, and are working with a designer who is doing wonderful work creating colourful illustrations to accompany the facts. The group is also developing a website that will provide a bit of additional information beyond what can fit on a beer mat. The beer mats and website will be unveiled at an official launch event in August, so look out for the announcement of the exact date in the next few weeks. In the meantime, check out the image below for a sneak preview of one of the beer mats. They’ve obscured it a bit though...as you’ll have to wait until the launch event to see the final versions!



For more information about the project, please feel free to contact biodiversitybeermats@gmail.com

BATKE, S.P. 2012. A preliminary survey of epiphytes in some tree canopies in Zambia and the Democratic Republic of Congo. *African Journal of Ecology*, doi: 10.1111/j.1365-2028.2012.01330.x

CHARMAN, D. J., HOHL, V., BLUNDELL, A., MITCHELL, F., NEWBERRY, J. & OKSANEN, P. 2012. A 1000-year reconstruction of summer precipitation from Ireland: Calibration of a peat-based palaeoclimate record. *Quaternary International*.

COXON, P., MITCHELL, F.J.G., & Wyse Jackson, P.N. 2012. Wicklow in the Grip of an Ice Age, 1, *Dublin, Irish Quaternary Association*, i – 48.

EGAN, P. A. & VAN DER KOOY, F. 2012. Coproduction and Ecological Significance of Naphthoquinones in Carnivorous Sundews (*Drosera*). *Chemistry & Biodiversity*, 9, 1033-1044.

KEEGAN, J. D. & HOLLAND, C. V. 2012. A comparison of *Toxocara canis* embryonation under controlled conditions in soil and hair. *J Helminthol*, 1-7.

POWER, E. F., KELLY, D. L. & STOUT, J. C. 2012. Organic Farming and Landscape Structure: Effects on Insect-Pollinated Plant Diversity in Intensively Managed Grasslands. *PLoS one*, 7, e38073.

RESEARCH FOCUS

Fine dining for Vultures

Vultures are the only vertebrates in existence that feed exclusively on carrion, the remains of dead animals. A dependence on carrion has its drawbacks though. The Asian vulture population suffered a catastrophic decline during the 90s due to farmers' use of specific growth hormones for cattle which were found to be fatal to vultures. A consequence of this was an explosion in numbers of opportunistic scavengers such as feral dogs who were quick to fill the recently vacated niche. Unfortunately, these dogs were vectors for the rabies virus and so the decline in vulture numbers led to a rise in rabies infections in humans, an unforeseen outcome.



A pair of White-backed Vultures (*Gyps africanus*) at Hlane Royal National Park, Swaziland (Photo courtesy of Adam Kane)

Once identified, the hormone was banned from use. However, the fear now is that the drug will enter the black market and affect vultures in other parts of the world, specifically Africa.

One way to avoid a reoccurrence of this crisis is to establish 'vulture restaurants' and this is being investigated by TCBR PhD researcher Adam Kane. The concept is simple. Supply vultures with a steady, predictable food source. The supplier knows where the carcass is coming from and can be sure that it will have no ill effects on the birds. Such a restaurant is currently being created in association with TCBR researchers in Swaziland, Southern Africa, using culled animals. Carrion cannot be supplied every day otherwise the restaurant turns into an ecological trap. In other words there has to be a balancing act here lest the vultures become overly dependent on it as a food source. Moreover, vultures typically search for ephemeral food. In the wild carcasses do not appear according to a timetable. This change in food availability may lead to behavioural changes in the birds; something that will be investigated throughout this project.

The restaurant will also grant an opportunity to gain more insights into the foraging behavior of vultures. So in addition to culled animals the site will have a walk-in trap designed to capture the birds. The trap can capture tens of birds and will allow researchers to measure and tag them so they can be identified more readily once released. Any insights into the way these birds locate carrion would be an invaluable boon to conservation biologists interested in keeping vultures around.



An impala provided for the vulture restaurant in Swaziland (Photo courtesy of Adam Kane)

Can Invasive species impact on native parasite communities?

The introduction of a new species into a community can have widespread effects. While often not considered, these effects extend to communities of parasites. Research undertaken by PhD student Karen Loxton, under the supervision of Professor Celia Holland, is investigating this phenomenon in the parasitic intestinal helminths of two small woodland rodents in Ireland. The native wood mouse (*Apodemus sylvaticus*) is found throughout Ireland while the invasive field vole (*Myodes glareolus*) is at present restricted to the south-west of the country. This allows the comparison of the helminth communities of wood mice in the east to those in the south-west of the country.

Preliminary data suggest that where wood mice are found alongside voles they are infected with fewer parasite species and lower numbers of individual parasites. Voles also appear to be less parasitised than they would be in their native ranges. This 'enemy release' can result in greater fitness for the host and is thought to be one explanation for the success of some invasives. This research will add to our understanding of the effects invasive species can have in their new environments. Parasites are underrepresented in biodiversity studies, though their effects on hosts, and through their hosts the wider community, can be large.

RESEARCH FOCUS

The Conservation of Turloughs

A recent research project based in Trinity, 'Assessing the Conservation Status of Turloughs', funded by the NPWS and the EPA, was a multi-disciplinary investigation into turlough biota and hydrology.

One aspect of this project examined the relationships between turlough vegetation and environmental and hydrological factors, and this research was carried out by Nova Sharkey and Steve Waldren.

Turloughs are commonly known as 'disappearing lakes' – they are ephemeral water bodies which occur on karst limestone; networks of underground channels and swallow-holes allow the turloughs to fill and empty in response to fluctuations in the level of the water table.



Coolorta turlough, Co. Clare, in winter (left) and summer (right) (Photos courtesy of Dr. Steven Waldren)

Turlough size can vary greatly from tens of meters in diameter to areas of several square kilometers. Similarly, depth can also vary up to 13m. Apart from area and depth, turloughs are highly variable environments – the hydrological regime (i.e. flooding frequency, depth, duration, timing of flooding), management (amount of grazing and type of grazers) and soil type and fertility can differ even between turloughs in the same catchment area. This means that turlough biota (flora and fauna) are subjected to different environmental factors in different turloughs, and even in different areas within the same turlough. This results in a high number of different plant communities. It also results in the zonation of these communities across the flooding gradient, from aquatic, water-dependent communities in the base of turloughs which retain water, to almost completely terrestrial vegetation around the periphery.

Turlough conservation is important for a number of reasons. Some of the plant communities which occur here are not found in any other habitat in Ireland. Turloughs are also important habitats for a number of Red Data Book species, and are the only habitat in the British Isles where the fairy shrimp (*Tanytarsus stagnalis*) is found. They also provide important over-wintering grounds for migratory birds. Some turloughs are protected under the Birds Directive and the Habitat Directive, while under the Water Framework Directive; they are designated as Groundwater Dependent Terrestrial Ecosystems, and as such Ireland is obliged to maintain them at a 'favourable conservation status'. The

vegetation communities of 22 turloughs from Counties Galway, Clare, Roscommon and Mayo were surveyed and 28 vegetation communities were identified, classified and described. These communities ranged from the fully aquatic to mostly terrestrial, with a range of intermediate vegetation types in between. There was a degree of overlap between the species composition of many of the plant communities; few species were faithful to a single plant community. The strongest drivers of turlough vegetation were identified as duration of flooding, timing of the recession of floodwaters, maximum depth of flooding, soil type, total phosphorus concentration of water, and to a lesser extent total nitrogen, and land use i.e. whether a land-parcel was grazed or not. Plant species were assigned to categories in different plant functional trait groupings to assess the traits used by plants to survive in the turlough environment. There was a general trend for increased number of annual species as the duration of flooding increased; these plants survive the flooded period as seeds; germinating, growing and reproducing during the dry period. The number and cover of species with little or no clonal growth decreased, as mean duration of inundation increased. Rhizomatous species were the most common of those with clonal growth, and the number and cover of species in this category increased with increased duration of inundation. The vegetation data were analysed in conjunction with soil, hydrological and water nutrient data, which were made available by the following members of the turlough research project: Sarah Kimberly, who was the post-doc coordinating the project, surveyed soil nutrient status and created soil type maps for each of the turloughs, and also provided data on land use; Owen Naughton provided the hydrological data; and Helder Cunha Pereira and Gwendoline Porst provided the water nutrient data.



Blackrock turlough shortly after a rapid emptying of floodwaters (Photo courtesy of Dr. Nova Sharkey)

RESEARCH

EVENTS

Paving the way for the creation of more cost-competitive biofuels

As the demand for energy surges in the 21st century, societal concerns about greenhouse gas emissions, soaring oil prices and energy security are forcing policy makers to explore alternative, renewable and sustainable sources of energy like biofuels. The biofuels currently available on the market (ethanol and biodiesel) are predominantly produced from corn grain, sugar cane and soybean. However to achieve a substantial substitution for gasoline, it has been proposed by many that lignocellulosic biomass from many sources, including grasses (Poaceae), should be considered as feedstocks for bioethanol.



Photo courtesy of Jesko Zimmermann

The current conversion of lignocellulosic biomass into fermentable sugars is inefficient and costly as plant cell walls have evolved a resistance to microbial and enzymatic deconstruction, commonly known as 'biomass recalcitrance'. This problem can be overcome through a pre-treatment stage, but is very costly. Hence it has been suggested that engineering feedstock crops with cell walls more amenable to pre-treatment or are sufficiently altered to require no pre-treatment at all (lignin modification), will make biofuels more cost competitive with fossil fuels.

TCBR researchers, Dr Trevor Hodkinson and PhD student, Vishnu Mohanan, are undertaking research to characterize genes that are involved in the synthesis of lignocellulose, especially in grasses, to allow work on gene manipulation in the future. It has previously been suggested that the complete lignin pathway first appeared in mosses and the expansion of lignin biosynthesis gene families occurred after the speciation between monocots and dicots. Although this pathway has been well characterized in a few organisms, there is very little information on how these genes evolved in grasses.

The aim is to characterize, via DNA sequencing, lignin and cellulose genes in the grass family and to analyze their evolution using phylogenetics. We want to also try and date major divergence periods in the genes and also elucidate the origin of woody (bamboos) and herbaceous grasses.

The EPA Sustainable Environment Call features a call for biodiversity research. See the following link for details: <http://www.epa.ie/researchandeducation/research/funding>

SIMBIOSYS Final Conference (TCD) Thursday the 28th of June. Full conference programme is available on the TCBR website at: <http://www.tcd.ie/tcbr/>

The National Biodiversity Data Centre has now made it even easier to submit your species records (both rare and common). To view their new system please visit: <http://records.biodiversityireland.ie/> Happy recording!

IUFRO 2012 Conference (UCC) 2nd International Conference on Biodiversity in Forest Ecosystems and Landscapes, 28th-31st of August. <http://www.ucc.ie/en/iufro2012/>

EECB 2012 (Glasgow) 3rd European Congress of Conservation Biology, 28th August-1st September. <http://www.gfoe-2012.de/>

49th Annual meeting of the Ecological Society of Germany, Austria and Switzerland (Germany), 10th-14th September 2012. <http://www.gfoe-2012.de/>

Joint meeting of the Royal Entomological Society and the (RES) and the Institute of Ecology and Environmental Management (IEEM) 'Techniques and Approaches for Assessing the Importance of Invertebrates in Environmental Impact Assessments' (Kent, UK) 10th October 2012. <http://www.ieem.net/ieem-resmeeting2012.asp>

Scandinavian Association of Pollination Ecologists (SCAPE) Conference (Norway), 25th-28th of October 2012.

REQUESTS

Please send in information concerning current research, calls, news, publications and wildlife photos from field trips for inclusion in our next quarterly newsletter.

Please donate biodiversity books to the TCBR library.

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