

LIVRO DE RESUMOS

23º Encontro Nacional de Ecologia

Investigação
ecológica ao
serviço da
conservação

24-26 novembro 2024, Cidade do Porto



U. PORTO

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BIOPOLIS

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INSTITUTO
PERHAMBUCO-PORTO
BRASIL



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CAPÍTULO 1

MENSAGEM



23º Encontro Nacional de Ecologia 2024

A investigação ecológica ao serviço da conservação

Porto, 24-26 Novembro 2024

A actual situação de alteração climática, evidenciada pelos ecossistemas terrestres e marinhos que mostram sinais de aproximação aos limites críticos, indicia para riscos a nível global. Os limites, uma vez ultrapassados, poderão resultar em mudanças rápidas e persistentes. Gerir e mitigar com precisão os riscos requer uma mudança fundamental no pensamento sobre o valor da natureza, incluindo a contabilização do capital natural e dos custos da degradação dos ecossistemas no desenvolvimento económico e na qualidade de vida.

Existe um consenso crescente de que, para limitar o aquecimento global a menos de 2°C, será necessário reduzir drasticamente as emissões e remover o dióxido de carbono da atmosfera, apostando largamente nas energias renováveis. Os investidores privados e uma miríade de empresas em fase de arranque estão a procurar obter licenças para implementar estas novas tecnologias. Para isso, serão necessárias monitorizações adequadas e fiscalização contínua, a fim de reduzir efectivamente a pegada de carbono, sem descuidar a protecção dos habitats e das espécies, para travar as tendências globais de perda de biodiversidade.

Qual o papel da investigação ecológica, básica e fundamental, para dar resposta a estes novos desafios? Como integrar o conhecimento gerado pelos ecólogos no planeamento de conservação? Como proteger o que ainda não se conhece? Como mostrar que o conhecimento das comunidades biológicas e do seu funcionamento é necessário e urgente para compreender as consequências ambientais, económicas e sociais de uma transição energética feita a qualquer custo? Estas e outras questões serviram de mote à necessidade dos ecólogos se juntarem, partilharem experiências e resultados e discutir temas relevantes que procuram juntar a ciência à sociedade, sem abdicar do seu foco principal: não há conhecimento sem investigação, não há planeamento correcto sem bases científicas.

À semelhança do que iniciámos o ano passado, o ENE organiza um painel de discussão, moderado por uma jornalista. Este ano, o painel conta com a participação de investigadores, membros de empresas de energia e um membro do Instituto de Conservação da Natureza e Florestas (ICNF). Este fórum de discussão, sobre o papel da investigação ecológica ao serviço da transição climática e económica, faz parte da actual abertura estratégica da SPECO à sociedade, em resposta aos problemas que nos afectam.

A oferta de workshops no dia 24 mostrou boa receptividade, graças à disponibilidade de ecólogos seniores, Verónica Ferreira, Maria Amélia Martins-Loução, Pedro Gomes e ainda a comunicadora de ciência Cristina Soares, possibilitando a todos os inscritos, e não só, participar em actividades diversas e sempre actuais.

Desde 2019 que a SPECO aposta em defender a sustentabilidade dos seus ENs. Este ano, temos mais avanços e pretendemos realizar uma avaliação mais criteriosa, pelo que contamos com o apoio de todos os participantes. Sigam-nos online para ficarem a par do que organizámos e ajudar-nos a melhorar.

Como nota final, agradecemos o apoio dos dois centros de investigação que nos acolhem no Porto: o CIBIO (Centro de Investigação em Biodiversidade e Recursos Genéticos) e o CIIMAR (Centro Interdisciplinar de Investigação Marinha e Ambiental), ambos da Universidade do Porto, onde a investigação fundamental é um ponto forte e exemplo de suporte a soluções aplicadas. Foram eles que nos apoiaram em toda a organização. Uma palavra especial para o Instituto de Pernambuco que nos abriu portas e cedeu um espaço de qualidade que muito nos honra.

A comissão organizadora do 23º Encontro Nacional de Ecologia (ENE), agradece a todos os que enviaram trabalhos nos vários domínios da ecologia e convida-os a estabelecer um forte intercâmbio científico e a participar de forma activa.

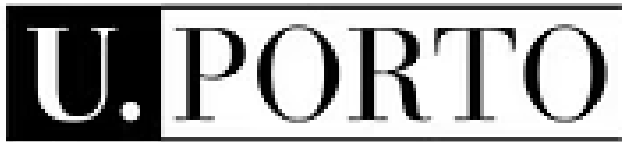
Bom Encontro!

A Comissão Organizadora

CAPÍTULO 2

PARCEIROS





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CAPÍTULO 3

COMISSÃO ORGANIZADORA



| NOME | AFILIAÇÃO |
|---------------------|--------------------------------|
| Henrique Queiroga | SPECO |
| Elsa Froufe | CIIMAR |
| Francisco Arenas | |
| Irene Martins | |
| Carlos Vila-Viçosa | BIOPOLIS/CIBIO |
| Clara Grilo | |
| Luís Reino | |
| Helena Serrano | cE3c, FCUL Lisboa, SPECO |
| Maria Amélia Loução | |
| Mónica Maia-Mendes | Centro de Formação da SPECO |

CAPÍTULO 4

COMISSÃO CIENTÍFICA



| NOME | AFILIAÇÃO |
|-----------------------|-----------|
| João Alexandre Cabral | UTAD |
| Edna Cabecinha | |
| José Alves | CESAM |
| Ana Hilário | |
| Marina Cunha | |
| Heliana Teixeira | |
| Ricardo Calado | |
| Rita Torres | |
| Jorge Gonçalves | CCMAR |
| Joana Cruz | |
| Vânia Baptista | |
| Aschwim Engelen | |
| Jaime Ramos | MARE |

| NOME | AFILIAÇÃO |
|---------------------|-----------------------------------|
| Pedro Gomes | CBMA |
| Felipe Costa | |
| Ronaldo Sousa | |
| Sílvia Carvalho | BIOPOLIS/CIBIO |
| Miguel Porto | |
| Sara Santos | MED-UEvora |
| Ana Sofia Reboleira | cE3c |
| Pedro Vaz | |
| Alice Nunes | |
| Ana Filipa Filipe | ISA, Centro de Estudos Florestais |
| Mário Boieiro | cE3c, polo dos Açores |
| Isabel Amorim | |

CAPÍTULO 5

ORADORES CONVIDADOS





ANA COLAÇO

"Ecosistemas marinhos vulneráveis nos Açores - tesouros escondidos em profundidade"

Ana Colaço é investigadora na Universidade dos Açores há mais de 20 anos. É especializada em ecossistemas marinhos vulneráveis do mar profundo como fontes hidrotermais e agregações de esponjas. Trabalha em ecologia trófica e funcionamento e conservação de ecossistemas. Tem uma vasta experiência em cooperação internacional, participando em vários projectos dedicados a observatórios; ecologia e impactos no mar profundo conservação do Atlântico Norte. É membro do Conselho Científico das Ciências Naturais e do Ambiente da FCT. Participou na Segunda Avaliação Mundial dos Oceanos das Nações Unidas. Está envolvida como perita em vários painéis de aconselhamento ciência-política das Nações Unidas (Autoridade Internacional dos Fundos Marinhos) CBD (EBSA e o GBF 2030). Atualmente é co-presidente do Grupo de Trabalho de Ecologia do Mar Profundo do ICES e é Comissária da Comissão do Mar dos Sargaços. Participou em mais de 40 cruzeiros oceanográficos com submersíveis.



CRISTINA NABAIS

"Dendrocronologia no Mediterrâneo - informação ecológica e climática"

Cristina Nabais, Professora Associada com Agregação do Departamento de Ciências da Vida da Universidade de Coimbra, leciona na área da Ecologia e Ecofisiologia de plantas. Fundou e coordena o Laboratório de Dendrocronologia (MedDendro Lab) da Universidade de Coimbra. O laboratório tem 4 linhas de investigação principais: i) Dendrocronologia de espécies do Mediterrâneo; ii) Xilogénese de pinheiros mediterrânicos; iii) Resposta fisiológica e anatómica de espécies arbóreas ao stress hídrico; iv) Dendroarqueologia, o estudo de madeiras históricas e arqueológicas. Atualmente é uma das editoras-chefe da revista *Dendrochronologia* da Elsevier.



JOSÉ CARLOS BRITO

"Investigação científica ao serviço da conservação dos desertos: 20 anos de experiências desde o Saara à Península Arábica"

Após completar o doutoramento na Universidade de Lisboa em 2003, chegou ao CIBIO/U. Porto como Investigador de Pós-doutoramento com o intuito de liderar investigação científica em desertos. Ao longo dos últimos 20 anos de actividade na U. Porto, usufruiu de bolsas de pós-doutoramento, contractos Ciência 2008, Investigador FCT, CEEC Individual, e actualmente tem um contracto como Investigador Principal no âmbito do programa CEECINST pela FCT. Em 2010 criou o grupo de investigação BIODESERTS – Biodiversidade de Desertos e Regiões Áridas no CIBIO/U. Porto, o qual tem fundamentado as actividades de investigação. Neste contexto teve a oportunidade de orientar 15 teses de doutoramento e 27 teses de mestrado desenvolvidas tanto na U. Porto como em Universidades estrangeiras, assim como liderar ou participar em cerca de 20 projectos científicos e contractos de investigação, quase sempre no âmbito da investigação em desertos. Durante os últimos 20 anos, participou em mais de 40 expedições científicas ao Norte de África e Península Arábica, tendo realizado trabalho de campo em mais de 10 países, acumulando um total de 1.200 dias de trabalho de campo e quase 300.000 quilómetros percorridos em ambientes desérticos. Tem mais de 250 publicações científicas ou de disseminação da ciência. Actualmente lidera 5 giga-projectos na Arábia Saudita relacionados com a gestão e conservação da biodiversidade em desertos, a formação de recursos humanos e infraestruturais, e a divulgação e educação científica.



JEAN-BAPTISTE LEDOUX

“Uma perspectiva multidisciplinar sobre a conservação dos corais mediterrânicos impactados por eventos climáticos extremos”

Jean-Baptiste Ledoux é investigador no Centro Interdisciplinar de Investigação Marinha e Ambiental (CIIMAR) no Porto. A sua investigação centra-se na biologia da conservação, ao nível infra específico, e na interação entre ecologia e biologia evolutiva. Estuda espécies marinhas formadoras de habitats impactadas por alterações globais, com foco em corais temperados impactados pelas mudanças climáticas induzidas por atividades antropogénicas. Combina genética populacional/genómica e ecologia (monitorização, experiências) para abordar diferentes tópicos, desde a história da recolonização (Ledoux et al. 2018; 2021) até à biologia populacional (Ledoux et al. 2020; Gazulla et al. 2021), limites de espécies (Coelho et al. 2023) e funcionamento de áreas marinhas protegidas (Horaud et al. 2023).

CAPÍTULO 6

PAINEL MESA-REDONDA

“A investigação ecológica ao serviço
da transição climática e económica”



Fernando Ascensão | Investigador Auxiliar, Faculdade de Ciências, Universidade de Lisboa, cE3c - Centre for Ecology, Evolution and Environmental Changes.

Joana Bernardino | Investigadora de pós-doutoramento, BIOPOLIS/CIBIO.

Licenciada em Biologia Ambiental (terrestre), pela Faculdade de Ciências da Universidade de Lisboa. Tem vasta experiência em consultoria e investigação aplicada na área de avaliação de impactes de infraestruturas, como parques eólicos, linhas elétricas e estradas, na biodiversidade. A sua tese de doutoramento (pela Univ. do Porto) ganhou, em 2022, o prémio SPECO para melhor “doutoramento em Ecologia”, tendo a sua investigação se focado na melhoria do conhecimento sobre o risco de colisão das aves com linhas elétricas, assim como das estratégias de mitigação e monitorização deste impacte. É atualmente investigadora do centro BIOPOLIS/CIBIO, onde desenvolve a sua investigação no âmbito na parceria “REN-BIOPOLIS em Biodiversidade” e outros projetos nacionais e internacional ligados a infraestruturas de energia.

Ricardo Portela Rosa | OW Environmental & Permitting, WindFloat Atlantic.

Liliana Benites | EDP Environmental Operations Portugal. Liliana Benites, formada em Eng^a do Ambiente pela Universidade de Aveiro, trabalha atualmente na unidade organizativa de Environmental Operations Portugal da EDP. Esteve ligada ao licenciamento e construção de projetos hidroelétricos, nomeadamente o AH de Foz Tua, incluindo a implementação das respetivas medidas ambientais. Atualmente atua no licenciamento de novos projetos de energia e na implementação e manutenção de medidas ambientais da fase de exploração dos ativos.

Sandra Sarmento | Instituto da Conservação da Natureza e Florestas do Norte.

Sandra Sarmento é Diretora Regional da Conservação da Natureza e Florestas do Norte desde maio de 2019 e Vogal do Conselho Diretivo do ICNF desde setembro de 2018, em janeiro de 2023 foi nomeada Vogal não executiva da Fundação Côa Parque. Tem uma licenciatura em Arquitetura Paisagista (Universidade de Évora, 1995), mestrado em Instrumentos e Técnicas de Apoio ao Desenvolvimento Rural - Especialização de Gestão de Recursos Naturais (Universidade de Trás-os-Montes e Alto Douro, 2002), pós-graduação em Desenvolvimento Sustentável e Promoção da Iniciativa Local em Meios Rurais (Associação Nacional de Oficina de Projeto em parceria com a Universidade de Trás-os-Montes e Alto Douro, 2007), Pós-graduação em Incêndios Florestais (ISLA, 2021), tendo concluído a componente curricular do curso de Doutoramento em Arquitetura Paisagista e Ecologia Urbana (Faculdade de Ciências da Universidade do Porto, 2012). Sandra Sarmento foi Chefe de Divisão do Douro Interior (maio de 2013 a setembro de 2018) e Chefe de Divisão de Planeamento e Comunicação (agosto de 2012 a maio de 2013), na Administração da Região Hidrográfica do Norte da Agência Portuguesa do Ambiente.

Moderadora: Aline Flor | Jornalista.

"É Natural do Rio de Janeiro mas vive em Portugal há 25 anos. Foi directora do Jornal Universitário do Porto, passou pela Ciência e Tecnologia no Canal Superior, editou notícias do portal AEIOU.pt. Fez um mestrado em Cinema Documental e entrou no PÚBLICO para integrar a equipa de áudio, onde produziu podcasts em áreas desde a igualdade de género às questões europeias. Hoje faz parte do Azul, secção dedicada à crise climática e sustentabilidade. Tem prazer em ouvir e contar histórias que ficam à parte e está sempre aberta a novos desafios, especialmente os pouco óbvios, difíceis de explicar."
In publico.pt

CAPÍTULO 7

PROGRAMA GERAL



23º ENCONTRO NACIONAL DE ECOLOGIA

| | DIA 24 | DIA 25 | DIA 26 |
|-----------|---------------------------|---------------------|--------------|
| 9h00 | WORKSHOPS | ABERTURA DO 23º ENE | |
| | | PLENÁRIA | PLENÁRIA |
| | | SESSÕES | SESSÕES |
| 12h30 | ALMOÇO | ALMOÇO | ALMOÇO |
| | WORKSHOPS | PLENÁRIA | PLENÁRIA |
| | | SESSÕES | MESA-REDONDA |
| | PRÉMIOS | | |
| | CERIMÓNIA DE ENCERRAMENTO | | |
| A definir | RECEPÇÃO DE BOAS VINDAS | | |
| | | JANTAR | |

CAPÍTULO 8

PROGRAMA DETALHADO



24 Novembro | Domingo

| Horário | Programa Social | Horário | Workshops |
|---------------|---|---------------|---------------------------------------|
| | | 09:00 - 17:00 | Introdução à meta-análise em Ecologia |
| 14:30 - 15:30 | Visita ao Jardim Botânico do Porto | 15:00 - 17:00 | Como comunicar Biodiversidade |
| 15:30 - 16:30 | Visita à Galeria da Biodiversidade | 17:00 - 18:00 | |
| 15:30 | Abertura do 23º Encontro Nacional de Ecologia | | |
| | Registo dos participantes aberto | | |
| 18:30 | Recepção de Boas Vindas: Porto de Honra | | |

25 de Novembro | 2.ª Feira - Sessão 1

| Horário | Tipo de apresentação | Autor | Título da Comunicação |
|---------|--|-------------------|---|
| 08:30 | Registo | | |
| 09:00 | Abertura do 23º Encontro Nacional de Ecologia | | |
| | Moderadores: Maria Amélia Martins-Loução & Elsa Froufe | | |
| 09:15 | Plenária | José Carlos Brito | Investigação científica ao serviço da conservação dos desertos: 20 anos de experiências desde o Saara à Península Arábica |
| 09:45 | Regular (Online) | Tiago Pinto | Tell me where you go, and I'll tell you where you die: landscape connectivity as a tool to predict amphibian roadkill risk |
| 10:00 | Regular | Joana Marcelino | Avaliação dos fatores de risco de colisão de cegonha-branca com linhas elétricas através de seguimento por GPS |
| 10:15 | Regular | Mattia Quaranta | The impact of transportation Infrastructure on African terrestrial vertebrates |
| 10:30 | Pausa para café | | |
| | Moderadores: Helena Hespagnol & Helena Serrano | | |
| 11:00 | Flash | Carlos Paya | Impact of diet on kleptoplastidic sea slugs' lipidome during photosynthetic decline |
| 11:05 | Flash | Fernanda Garcia | Habitat quality and prey presence drive red fox activity patterns and predator-prey interactions |
| 11:10 | Flash | Daniel Ricardo | Space and Time: How Red and Fallow Deer Share Their World |
| 11:15 | Regular (Online) | Luisa Quezado | Environmental drivers that shape red fox occupancy patterns in Portugal |
| 11:30 | Regular | Nuno Pereira | When wolves and people meet: behavioral characterization of Iberian wolf sightings in relation to humans |
| 11:45 | Regular | Joana Freitas | Horses on the menu: Patterns and drivers for free-roaming horse consumption by Iberian wolves |
| 12:00 | Regular | Mário Boeiro | Diversidade de polinizadores e interações planta/polinizador em diferentes usos do solo da ilha Terceira (Açores) |
| 12:15 | Regular | Vanda Acácio | Effects of shrub dominance and diversity on Mediterranean oak seedling survival: the interplay of abiotic conditions and plant traits |
| 12:30 | Almoço | | |

25 de Novembro | 2.ª Feira - Sessão 1

| Moderadores: Mário Boieiro & Francisco Arenas | | | |
|---|------------------------|--------------------------|--|
| 14:00 | Plenária | Ana Colaço | Ecosistemas marinhos vulneráveis nos Açores - tesouros escondidos em profundidade |
| 14:30 | Flash (Online) | Andressa Griebler Gusmão | Taxas de germinação e crescimento em plântulas de Quercus suber sob diferentes substratos: Implicações para a fixação de carbono no Nordeste de Portugal |
| 14:35 | Flash | Guilherme Barreto | O desaparecimento dos amieiros afeta a qualidade e a decomposição da folhada de espécies arbóreas não fixadoras de azoto em meio aquático |
| 14:40 | Flash | J. Filipe Faria | Sharing blood parasites: Infection dynamics on two sympatric wall lizard species (genus Podarcis) across 10 years |
| 14:45 | Flash | Tomás Correia | Impacts of environmental factors on endangered amphibians Chioglossa lusitanica and Rana iberica occurrence and abundance in the Lousã Mountain |
| 14:50 | Flash | Diogo Moreira Sá | Estrutura biométrica, dendrocronologia e modelos de crescimento de Juniperus navicularis Gand., um zimbro endêmico e ameaçado |
| 14:55 | Flash | Joel Laia | Ecological aspects on the terpene synthases in Menthinae, Lamiaceae: convergent and divergent evolution |
| 15:00 | Regular | Helena Hespanhol | A relevância do microclima na distribuição das espécies de briófitas |
| 15:15 | Regular | Michaela Petropoulou | Shades of green: Exploring biodiversity in different forest areas. |
| 15:30 | Regular | João Craveiro | How roads drive mammal-mediated seed dispersal where forest meets the asphalt |
| 15:45 | Regular | Mário Santos | Unraveling the mechanisms behind associated biodiversity in alley cropping systems: insights from a simple cell-based spatial model |
| 16:00 | Flash | Maria Carolina Sousa | Ecosystem services of urban rivers: a systematic review |
| 16:30 | <i>Pausa para café</i> | | |

| Moderadores: Irene Martins & Alice Nunes | | | |
|--|---------------------------|-------------------------|--|
| 17:00 | Flash | Cláudia Carvalho-Santos | Trees4Water - custo-efetividade de cenários de floresta ripária para a melhoria da qualidade da água |
| 17:05 | Flash | Fabio Marcolin | Contrasting relationships between wealth and ecosystem services in invaded urban bird communities |
| 17:10 | Flash | Eusébio, R.P. | Shallow Subterranean Habitats in the Iberian Peninsula: mapping their distribution and cryptic biodiversity |
| 17:15 | Regular | Gomes, M.M. | Phylogeny and conservation of subterranean ground beetles (genus Trechus, Coleoptera, Carabidae) from continental Portugal |
| 17:30 | Regular | Mauro Nereu | New landscape, new connection: the effect of novel ecosystems on ecological networks subcommunities |
| 17:45 | Regular | Sara F. Nunes | Trophic ecology of the Madeira Wall Lizard throughout Azores archipelago, revealed by stable isotopes |
| 18:00 | Regular | António Costa | Gramíneas naturalizadas: desvendando o papel do clima nos padrões de distribuição na Europa |
| 18:15 | Regular | Sara Carona | A first look into the functional role of translocated species in the Iberian Peninsula |
| 18:30 | Regular | Carina Sá, C. | Diversity of cultivable bacteria and their plant growth-promotion abilities in maize grown under various water regimes |
| 18:45 | Regular | Mariana Filipe | Assessing the potential delivery of ecosystem services to support landscape planning, management and decision-making |
| 20:00 | <i>Jantar de convívio</i> | | |

25 de Novembro | 2.ª Feira - Sessão 2

| Horário | Tipo de apresentação | Autor | Título da Comunicação |
|---------|---|---------------------------|---|
| 08:30 | Registo | | |
| | Moderadores: Maria Amélia Martins-Loução & Elsa Froufe | | |
| 09:45 | Regular | Ana Lúcia Primo | Climate-driven changes of ichthyoplankton communities in an Iberian estuary – a 13 years study |
| 10:00 | Regular | Marisa A. Gomes | Integrating local knowledge and scientific data: Species distribution and fishing effort in NW Portugal |
| 10:15 | Regular | Bruna Vieira | Valuation of Deep-Sea Ecosystem Services - an overview |
| 10:30 | Pausa para café | | |
| | Moderadores: Helena Hespanhol & Helena Serrano | | |
| 11:00 | Flash | Filipe Martinho | Fish in the Hot Seat: Long-term effects of warming in estuaries |
| 11:05 | Flash | Graça, D. | Fungal diversity modulates the effect of multiple stressors on leaf litter decomposition in streams |
| 11:10 | Flash | Ana Amorim | ALISU: o Biobanco de microalgas marinhas da Universidade de Lisboa |
| 11:15 | Regular | Luís Afonso | Untapping biodiversity assessments: Metabarcoding analysis to characterize marine vertebrate communities in a coastal area |
| 11:30 | Regular | Maria Marques | Fishing and Biological Invasions: can we rely just on the legislation? |
| 11:45 | Regular | Inês Carvalho | Reassessing the Conservation Status of Bottlenose Dolphins in the Sado Estuary |
| 12:00 | Regular | Danielle Rudley | Disentangling the drivers of canopy greenness trends in the cork oak woodlands of Portugal |
| 12:15 | Regular (Online) | Marisa Naia | Habitat alteration, amphibian monitoring and citizen engagement: a multidisciplinary approach for freshwater conservation in Northern Portugal |
| 12:30 | Almoço | | |
| | Moderadores: Mário Boieiro & Francisco Arenas | | |
| 14:30 | Flash | Benjamin. A. Mosley | Occurrence of drought in the Guadiana and its impact on phytoplankton biomass |
| 14:35 | Flash | Catarina M. Alves | Environmental drivers of structural and functional patterns in macrofaunal communities on the NW Iberian Coast |
| 14:40 | Flash | Marcos Rubal | Sessile assemblages in marinas of North Portugal. Brackish vs Marine habitats |
| 14:45 | Flash | Puri Veiga | Ecosystem engineers influence the structure of vagile assemblages in marinas under different environmental conditions |
| 14:50 | Flash | Harold Cantallo | Coastal habitats around Santo Antão and their key habitat-forming species |
| 14:55 | Flash | Jesús Fernández-Gutiérrez | Biocontamination in marine and brackish marinas of North Portugal |
| 15:00 | Regular | Sandra Martins | Immunological resilience of a temperate catshark to a simulated marine heat wave |
| 15:15 | Regular | Inês Domingues | Response of Montado to Climate Change: Impacts on ecological indicators evidenced by drought simulation experiments |
| 15:30 | Regular | Dalescka Barbosa de Melo | Functional structure of benthic communities in reservoirs is shaped by climate extremes in a semi-arid region |
| 15:45 | Regular | Bianca Allegra Parodi | Disentangling the role of local ecology vs. latitude in thermal tolerance and the influence of cold- or warm-adaptation in phenotypic plasticity in an intertidal goby fish |
| 16:00 | Regular | Maria Espírito Santo | Resiliência das pastagens: padrões fenológicos e limiares críticos em face das alterações climáticas |
| 16:30 | Pausa para café | | |

25 de Novembro | 2.ª Feira - Sessão 2

| Moderadores: Irene Martins & Alice Nunes | | | |
|--|--------------------|-------------------|--|
| 17:00 | Flash | Fernandes, R | Revisiting the distribution and unveiling the feeding preferences of the weevil <i>Stenopelmus rufinasus</i> , a biocontrol agent for <i>Azolla filiculoides</i> accidentally introduced in Portugal |
| 17:05 | Flash | Juliana Barros | Mining activities exacerbate nanoplastic impacts on freshwater ecosystem functioning |
| 17:10 | Flash | Seena Sahadevan | Aquatic fungal responses to polystyrene nanoplastics and metal pollution in streams |
| 17:15 | Flash | Sarra Ben Tanfous | Impact of polyethylene on leaf litter decomposition in freshwater ecosystems |
| 17:20 | Flash | Beatriz Neves | The role of life stages in the sensitivity of <i>Hediste diversicolor</i> to nanoplastics: a case study with Poly(Methyl)Methacrylate (PMMA) |
| 17:25 | Flash | Inês Silva | Poluição de plástico nos rios portugueses, uma ameaça crescente |
| 17:30 | Regular | Valéria Giménez | Contrasting trace elements bioaccumulation in <i>Hediste diversicolor</i> and <i>Scrobicularia plana</i> from Ria de Aveiro lagoon |
| 17:45 | Regular | Marta Silva | Behavioural and biochemical responses of <i>Hediste diversicolor</i> under combined polymethyl methacrylate nanoplastics and arsenic exposure |
| 18:00 | Regular | Bugalho M. N. | Effects of deer on the functioning of mediterranean oak woodlands: carbon, water and fire |
| 18:15 | Regular | Ricardo Oliveira | Importance of the conditioning status on leaf litter decomposition under salt pulse contamination in a manipulated stream |
| 18:45 | Regular (Online) | Bruno FCB Adorno | How does fire select different land use and land cover types in the Atlantic Forest? |
| 19:00 | | | |
| 20:00 | Jantar de convívio | | |

26 de Novembro | 3.ª Feira

| Horário | Tipo de apresentação | Autor | Título da Comunicação |
|--------------------------------|----------------------|-----------------------|--|
| Moderadores: Henrique Queiroga | | | |
| 09:00 | Plenária | Jean-Baptiste Ledoux | Uma perspectiva multidisciplinar sobre a conservação dos corais mediterrânicos impactados por eventos climáticos extremos |
| 09:30 | Flash | Juliana Lopes Almeida | Análise da estrutura florestal para auxiliar na seleção de áreas prioritárias para a restauração da conectividade da paisagem na Bacia Hidrográfica do Rio Turiaçu, Amazônia Maranhense, Brasil. |
| 09:35 | Flash | Afonso Petronilho | Bloom and Bite: two congeneric <i>Utricularia</i> species with distinct reproductive strategies |
| 09:40 | Regular | Helena Valentim | Avaliação da eficácia de áreas protegidas terrestres na preservação dos ecossistemas fluviais |
| 09:55 | Regular | Ana Pinheira | Promoting a sustainable urban development through innovative ecological predictive tools and species conservation strategies |
| 10:10 | Regular | Nogueira, J. G. | Incorporating biotic interactions in systematic conservation planning |
| 10:25 | | | |
| 10:30 | Pausa para café | | |

26 de Novembro | 3.ª Feira

| Moderadora: Marina Dolbeth | | | |
|--|---|----------------------|--|
| 11:00 | Flash (Online) | Andreia Saragoça | Cânhamo Industrial como Solução Ecológica: O Caminho para a Sustentabilidade Ambiental |
| 11:05 | Flash (Online) | Mariana P. Fernandes | Connecting infrastructures and ecology to create landscape heterogeneity in grazed pastures |
| 11:10 | Flash | Diana S. Vasconcelos | Assessing reptile microbiome resilience to wildfire |
| 11:15 | Flash | Salomé Almeida | Serão as macroalgas e halófitas da costa portuguesa uma fonte de compostos antimicrobianos? |
| 11:20 | Flash | Ana Castanheira | Poderão as macroalgas e halófitas da costa portuguesa ser uma fonte promissora de compostos antitumorais? |
| 11:25 | Flash | Catarina Simões | Wildfires and their effect on the Lizards' Diet |
| 11:30 | Regular | Carlos Vila-Viçosa | Uma abordagem multidisciplinar à conservação da árvore mais ameaçada de Portugal – Quercus canariensis Willd." |
| 11:45 | Regular | António Vaz Pato | Nature might need some nurture: slow passive vegetation recovery in Mediterranean abandoned farmland. The Baixo Sabor case study |
| 12:00 | Regular | Carlo Bifulco | The access path to Praia do Telheiro (southwestern coast of Portugal) seven years after an ecological restoration project in a mediterranean environment |
| 12:15 | Regular | Mónica Q. Pinto | Soluções baseadas na Natureza: Recuperação de Ecossistemas Fluviais para Proteção do Património Cultural no Vale do Côa |
| 12:30 | Almoço | | |
| Moderador: Carlos Vila-Viçosaes: | | | |
| 14:00 | Plenária | Cristina Nabais | Dendrocronologia no Mediterrâneo - informação ecológica e climática |
| 14:30 | Flash | Sergio Chozas | +Biodiversity@CIÊNCIAS: Four years mobilizing CIÊNCIAS community for the improvement of the campus biodiversity and livelihood |
| 14:35 | Flash | Pedro Gomes | Os 5 Desafios COOP CORTADERIA: cidadãos cientistas contribuem para a gestão de plantas invasoras |
| 14:40 | Flash | Marcos Dias | Is existing legislation capable of protecting urban stream ecosystems in the context of OneHealth? |
| 14:45 | Regular | Sara H. Santos | Children for Nature: Exploring Environmental Literacy Through Podcasting |
| 15:00 | Regular | Freitas V. | Saltmarsh Ecosystems as Nature-Based Solutions for Water Quality Management and Climate Resilience: A Case Study from the Lima Estuary |
| 15:15 | Regular | Marina Dolbeth | Cascading effects of a seagrass active restoration to rehabilitate coastal ecosystems |
| 15:30 | Regular | Bruna Reis | A gestão do pastoreio para restaurar os serviços de ecossistema e promover a resiliência do montado às alterações climáticas |
| 16:00 | Pausa para café | | |
| 16:30 | A investigação ecológica ao serviço da transição climática e económica | | |
| Atribuição dos Prémios de Doutoramento em Ecologia Fundação Amadeu Dias | | | |
| 18:00 | Regular (Online) | Martina Panisi | Snails, forest and people: ecology and conservation of terrestrial molluscs in the Gulf of Guinea oceanic islands, central Africa |
| | Regular | Ana Paula Portela | Conectar biodiversidade, serviços de ecossistema e estabilidade ecológica para a sustentabilidade do ecossistema fluvial |
| | Regular | Joana Pereira | Human-wildlife interactions and livelihood vulnerability in the context of conservation in Mozambique |
| 18:45 | Atribuição dos prémios às melhores comunicações de estudantes de mestrado e doutoramento | | |
| 19:15 | Encerramento | | |

CAPÍTULO 9

RESUMOS



CAPÍTULO 9.1

PALESTRAS PLENÁRIAS

titulo

Ana Colaço

Okeanos Unv Açores

Resumo

Dendrocronologia no Mediterrâneo - informação ecológica e climática

Cristina Nabais

Universidade de Coimbra

O laboratório de dendrocronologia da Universidade de Coimbra, MedDendro Lab, apresenta três áreas de investigação pilares: i) dendrocronologia de espécies mediterrânicas; ii) estudos sobre a dinâmica de crescimento dos anéis de crescimento de *Pinus pinaster*, ou xilogénese; iii) datação de madeiras históricas e arqueológicas – dendroarqueologia.

A primeira linha de investigação é a mais antiga e representa um marco central no estabelecimento do laboratório de dendrocronologia da Universidade de Coimbra desenvolvendo um trabalho importante sobre a dendrocronologia de espécies mediterrânicas. Neste momento o laboratório apresenta um catálogo de amostras coletadas de árvores vivas com 3798 entradas, incluindo várias espécies (*Juniperus brevifolia*, *Juniperus phoeniceae*, *Juniperus thurifera*, *Quercus faginea*, *Quercus ilex*, *Quercus robur*, *Pinus pinaster* e *Pinus pinea*), constituindo uma coleção única a nível nacional.

A segunda linha de investigação foi iniciada em 2010 com o estabelecimento de uma estação de campo no pinhal da Tocha onde são recolhidas, há 14 anos, amostras para o estudo da xilogénese de *Pinus pinaster*, complementadas com dados de dendrómetros automáticos e manuais, que fornecem informações sobre o crescimento em perímetro das árvores. O acompanhamento da xilogénese é efetuado com a coleta de microcores cada 10 dias, sendo posteriormente preparados em laboratório para obtenção de cortes anatómicos, análise e contagem das várias fases da fenologia do xilema, desde a divisão das células do câmbio vascular, alargamento, espessamento da parede celular, até à maturação final das células do xilema. Esta base de dados, única em Portugal, irá permitir modelar as várias etapas de formação da madeira, e avaliar a sensibilidade climática dessas mesmas etapas.

A terceira linha de investigação é a mais recente, e foi iniciada em 2017. Neste momento o laboratório de dendrocronologia apresenta uma coleção considerável de amostras obtidas de escavações arqueológicas, nomeadamente do Campo das Cebolas, Praça D. Luís, Largo Conde Barão, e Alcântara, todas localizadas na zona ribeirinha de Lisboa, e de edifícios históricos, especificamente do Convento de Cristo, em Tomar, e do cadeiral de Santa Cruz, em Coimbra. A continuidade da coleta de amostras de madeira arqueológica e histórica em território nacional é de extrema importância porque, para além de representarem uma componente importante do património arqueológico e histórico, com informação relevante para os historiadores, apresenta também a possibilidade de aumentar o registo temporal das séries dendrocronológicas, com uma importância potencial para a climatologia.

Nos próximos anos pretendemos iniciar duas novas linhas de investigação: i) dendrocronologia e anatomia funcional de arbustos e ii) dendrocronologia de espécies tropicais africanas.

Multidisciplinary approach for the conservation of Mediterranean corals impacted by extreme climatic events.

José Brito

CIBIO/U

Os desertos, frequentemente vistos como paisagens estéreis e de baixa diversidade, albergam espécies altamente especializadas, representando cerca de 25% das espécies continentais de vertebrados. Nos últimos 20 anos, a minha investigação tem-se centrado na caracterização da vida selvagem dos desertos e no realce da sua singularidade, abrangendo o Norte e Oeste de África e o Médio Oriente. Este trabalho abrange três domínios principais: 1) Padrões de distribuição da biodiversidade: utilizando dados de ocorrência de expedições científicas, ferramentas de modelação ecológica e novas tecnologias como o eDNA e a deteção remota, a investigação mapeia as distribuições taxonómicas, os pontos críticos de biodiversidade e os impactos das alterações climáticas nos desertos. As principais realizações incluem estudos sobre populações relíquias de crocodilos no Sara, chitas em perigo no Irão e a descoberta de cinco novos vertebrados, incluindo o lobo africano. 2) Processos evolutivos e paisagísticos: analisando amostras biológicas com marcadores moleculares, a investigação explora as relações filogenéticas, a filogeografia e as estruturas populacionais. Contribuições notáveis incluem a compreensão da conectividade populacional em espécies ameaçadas, a descoberta do papel das montanhas do deserto na diversificação das espécies e a utilização da genómica para traçar a história evolutiva de espécies adaptadas ao deserto, como víboras e gerbos. Foram também desenvolvidas bibliotecas de DNA anfíbios e répteis do Saara. 3) Planeamento da conservação: a investigação tem como objetivo identificar espécies ameaçadas, definir prioridades de conservação e influenciar políticas. Destaca-se a ligação do declínio da vida selvagem aos conflitos armados, a defesa da proteção ambiental durante os conflitos e o planeamento de medidas adaptativas para a subida do nível do mar nas áreas protegidas africanas. Esta apresentação sublinha a importância ecológica e as necessidades urgentes de conservação dos desertos.

Multidisciplinary approach for the conservation of Mediterranean corals impacted by extreme climatic events.

Jean-Baptiste Ledoux

CIIMAR- Centro Interdisciplinar de Investigação Marinha e Ambient, Porto

The Mediterranean Sea is a hotspot of biodiversity but also a hotspot of anthropogenic climate change, including extreme climatic events. Recurrent marine heatwaves (MHWs) are driving mass mortality events (MMEs) since more than two decades. Long term monitoring show how MMEs are affecting thousands of kilometers of Mediterranean coastline until 45 m depth, impacting 50 taxa. Interestingly, different mortality rates among populations within species were reported. These results support differential vulnerability to thermal stress, with “resistant” and “sensitive” individuals and open new avenues for climate-resilient restoration.

I will present the results of a collaborative effort combining experiments in controlled conditions, genomics and population genetics, to characterize the factors involved in the differential vulnerability to thermal stress in the red gorgonian, *Paramuricea clavata*.

In a first experiment, we submitted samples from 11 populations distributed in the Mediterranean to a thermal stress to characterize the response variability at large spatial scale. We identified 50 “resistant” and 50 “sensitive” individuals and compared their genomic background using a genome wide association study. Our results support an absence of common major effect of loci associated with variation in thermal resistance.

In a second experiment, we conducted repeated thermal stress experiments over three consecutive years (2015-2017) using samples from the exact same individuals. Statistical modelling demonstrates the summer thermal regime prior to the experiment as the main factor affecting *P. clavata* ecological response to thermal stress in the three experiment. Adaptation, whether from genetic or phenotypic plasticity components, play a limited role in this response.

Overall, the red gorgonian seems to have very limited adaptive capacity to cope with the increasing frequency and intensity of heatwaves in the Mediterranean questioning the feasibility of climate-resilient restoration actions. Reducing greenhouse gas emissions remains the key piece to mitigating the impact of extreme climatic events linked to anthropogenic climate change.

CAPÍTULO 9.2

**APRESENTAÇÕES
REGULARES**

Nature might need some nurture: slow passive vegetation recovery in Mediterranean abandoned farmland. The Baixo Sabor case study

António Vaz Pato (1), Miguel Porto (1), Pedro Beja (1), Alice Nunes (2)

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During the last decades, land abandonment in rural areas in the Mediterranean Basin has left vast extensions of land submitted to unmonitored passive recovery. Despite the socio-economic challenges, rewilding has become a nature-based approach to tackle these issues. However, questions remain on whether rewilding is effective to passively restore disturbed semi-arid landscapes. Our study analyzed how vegetation succession is evolving in abandoned agricultural areas in semi-arid Northeastern Portugal. The goal is to provide information on the successional timeline based on vegetation's response to time since stand abandonment, while identifying landscape cofactors affecting this response to abandonment age. We used indicators such as woody plant species covers and key-species regeneration. Results show that the time to attain mature vegetation levels might exceed 80 years. Lower hill exposure to radiation and high forest cover proportion in the vicinity may play a positive role in the speed of recovery of late successional species while higher hill exposure may promote early successional species persistence in the plots. Therefore, this study suggests that, although Mediterranean semi-arid regions may take a considerable time to recover, favorable microclimatic conditions and landscape forest density may support faster recoveries. Overall, this study offers a scientific-based tool to decision-making when it comes to implementing rewilding strategies at a regional level.

Avaliação da eficácia de áreas protegidas terrestres na preservação dos ecossistemas fluviais

Helena Valentim (1,2); Maria João Feio (2); Salomé F. P. Almeida (1)

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O estabelecimento de áreas protegidas é uma das ferramentas mais utilizadas em conservação, priorizando habitualmente habitats e espécies terrestres. Os poucos estudos desenvolvidos para avaliar a eficácia destas áreas na proteção de ecossistemas fluviais contidos dentro dos seus limites, apontam para resultados contraditórios. Registos históricos de diatomáceas bentónicas e dados ambientais de 174 rios portugueses foram utilizados para explorar a existência de tendências ao nível da qualidade biológica e diversidade relacionadas com a existência de diferentes categorias de proteção. A qualidade biológica foi avaliada através do Índice de Polluosensibilité Spécifique (IPS) e do uso de traits (e.g., formas de vida, guildas ecológicas, tamanho celular). Os resultados obtidos sugerem que, embora as áreas protegidas terrestres não priorizem a conservação de ecossistemas de água doce, podem contribuir para sua preservação, uma vez que registam níveis de qualidade biológica e abundância de espécies ameaçadas significativamente superiores. Em contrapartida, a diversidade das comunidades não se revelou significativamente superior dentro de áreas protegidas e a existência simultânea de várias categorias de proteção nem sempre se traduziu numa maior proteção dos ecossistemas fluviais. Estes resultados reforçam a necessidade de identificar áreas protegidas dedicadas exclusivamente à preservação de ecossistemas fluviais, como medida eficaz para sua preservação integral.

Phylogeny and conservation of subterranean ground beetles (genus *Trechus*, Coleoptera, Carabidae) from continental Portugal

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Subterranean habitats, recognized for their unique and fragile troglobiont biodiversity and distinct abiotic conditions, remain among the least studied and protected habitats. Despite providing critical services like water purification, nutrient cycling, and climate regulation, these habitats are frequently neglected in both scientific research and conservation efforts. Subterranean biodiversity is notable for its remarkable diversity of invertebrates species, with the genus *Trechus* (Coleoptera: Carabidae) being the richest group of subterranean insects in continental Portugal. We studied the evolutionary history of hypogean *Trechus* beetles of continental Portugal. We sequenced the mitochondrial *cox1* gene of *T. gamae* Reboleira & Serrano 2009; *T. lunai* Reboleira & Serrano 2009; and *T. tatai* Reboleira & Ortuño 2010. These species are highly range-restricted, with some found exclusively in a single cave, and are classified as "Critically Endangered" or "Endangered" of extinction in the Portuguese Red Book of Invertebrates. Our results suggest low genetic variability between the hypothesized common ancestor *T. fulvus* Dejean, 1831, and the troglobiont species *T. gamae*, *T. lunai*, and *T. tatai*. Yet, distinct species-specific morphological traits and statistically significant differences in eye size were observed, indicative of divergent evolutionary histories and subterranean adaptations. The incongruence observed between genetic and morphological data suggests complex phylogenetic relationships among these *Trechus* species. Future research should incorporate additional molecular markers and morphological features and broaden taxonomic and geographic sampling. Such findings have the potential to contribute to accurately identifying conservation units and enhance existing strategies aimed at protecting these endemic beetles and their delicate habitats.

This work was supported by the "Fundação para a Ciência e a Tecnologia", through CE3C (UIDB/00329/2020) (<https://doi.org/10.54499/UIDB/00329/2020>), and by the European Union's programme "Programa de Mobilidade Erasmus+ da Universidade de Lisboa", financed by the European Commission.

Environmental drivers that shape red fox occupancy patterns in Portugal

Luisa Quezado (1), Eduardo Ferreira (1), Carlos Barroqueiro (1), Paloma Linck (1), Guilherme Ares-Pereira (1,2), Nuno Pinto (1), Mariana Rossa (1), Daniela Teixeira (1), João Carvalho (1), Nuno Negrões (3), Rita T. Torres (1), Miguel Rosalino (1,2)

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Identifying the main environmental drivers affecting species' occupancy patterns in a landscape change scenario is crucial for wildlife management and conservation. Nevertheless, such studies on generalist and wide-ranging species are uncommon. Here, we aim to assess the ecological drivers that shape red fox occupancy in northern and southern regions of Portugal. For this study, we compiled camera trap data from various scientific projects conducted throughout Continental Portugal. Between 2019 and 2021, a total of 767 and 190 camera traps were installed in northern and southern Portugal, respectively. We tested variables related to ecoregions, interspecific interactions, habitat, climate, and anthropogenic disturbance in single-species/single-season occupancy models to estimate red fox occupancy and evaluate its potential drivers. Our results showed that distinct drivers influence red fox occupancy patterns depending on the environmental context. In northern Portugal, which presents more humanized regions, red foxes occupy areas with a higher abundance of dogs because their presence may indicate areas with more available resources. In southern Portugal, dominated by agroforestry areas, red foxes avoided pine plantations probably because they may present lower food availability than diverse habitats. Our study highlights red fox highly adaptive behavior and adds crucial information for future management actions targeting this generalist species.

Habitat alteration, amphibian monitoring and citizen engagement: a multidisciplinary approach for freshwater conservation in Northern Portugal

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(3) University of Córdoba, Spain

(4) CIBIO/BIOPOLIS and University of Florence, Italy

Freshwater ecosystems provide essential services and the highest degree of species diversity of any other habitat. They are in sharp deterioration, paralleled by a decline in freshwater species (e.g., amphibians). Wetlands and amphibians suffer from a negative public perception that limits the impact that conservation measures can have on this habitat and animal group. The Regional Protected Landscape of Vila do Conde Coast and Mindelo Ornithological Reserve as numerous wetlands, and it is renowned for its international herpetological value. However, drastic habitat alterations are underway and management actions can be needed. This region represents an excellent model for developing an approach to bridge the research implementation gap by implementing long-term effective conservation measures. This presentation aims to present preliminary results on the amphibian community composition in the Reserve and on the local communities' knowledge and perception of freshwater ecosystems. Ultimately, this research project aims to integrate landscape changes analysis and amphibian community characterisation, with the development of citizen engagement activities, through science communication research, to develop science-based measures for freshwater conservation.

This work is part of a PhD project funded by the Fundação para a Ciência e a Tecnologia (2023.02820.BD).

Reassessing the Conservation Status of Bottlenose Dolphins in the Sado Estuary

Inês Carvalho (1,2); Francisco Martinho (2,3); Filipa Borges (1,4,5); Jon Barber (6); Raquel Gaspar (7); Marina Sequeira (8); Mónica A. Silva (9); Luís Freitas (10); Marisa Ferreira (11); Ana Marçalo (12); Alfredo Lopez (13,14); Renaud de Stephanis (15); Joan Giménez (16); Pauline Gauffier (10,15); Rob Deaville (17); Paul Jepson (17); Graham J. Pierce (18,19) Lounès Chikhi (1,20,21)

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Identifying threatened populations and assessing their vulnerability is crucial for establishing conservation priorities and providing reliable data for decision-making. Small population size is a key factor that increases the risk of extinction due to demographic stochasticity and genetic factors. Over the past four decades, research on the bottlenose dolphin (*Tursiops truncatus*) population inhabiting the Sado Estuary has revealed year-round fidelity, very low immigration rates, high calf mortality, an ageing and declining population. In this collaborative study, we update previous findings on population dynamics and introduce important new data on genetic diversity, inbreeding levels, population structure, and persistent organic pollutant (PCBs) loads.

We found lower levels of genetic diversity and higher levels of inbreeding in the Sado population than in the other populations of the bottlenose dolphin sampled along the Atlantic coast (Iberian Peninsula, Azores, Madeira). The Sado dolphins are also genetically differentiated from these populations, suggesting an isolated population. Regarding PCBs, most individuals had concentrations exceeding the toxicological threshold for PCB exposure (>41mg/kg lipid weight). This result, combined with the fact that this population inhabits an estuary characterized by multiple sources of contamination and increasing human pressures, highlights the critical state of this resident dolphin population and the urgent need for effective conservation measures.

Fishing and Biological Invasions: can we rely just on the legislation?

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Fishing activities represent a key pathway of introduction and spread of the invasive fish fauna, particularly in freshwaters, with alien fish establishment events happening worldwide. Managing this pathway could be one of the most effective ways of preventing freshwater fish invasions. At the European Union level, EU1143/2014 regulation sets the management of invasive alien species in order to protect native biodiversity and ecosystem services, reporting fishing activities also as potential control mechanisms. Despite this, the performance of the regulations depends on fishermen's cooperation and the efficiency of the law reinforcement. In order to understand competitive fishermen's (I) knowledge of the Union's legislation, listed species and law enforcement and (II) interest in managing invasive fish fauna during fishing activities, a survey was conducted at two World Fishing Competitions between May and August 2024. In this presentation, fishermen's perception about the impact of invasive exotic fish species on their activity will be presented, as well as the 3 most disliked invasive alien fishes and the 5 main reasons for this negative sentiment. Our findings will contribute to the implementation of strategic invasive alien fish management strategies, taking advantage of and learning from the perceptions of the most important actors in this arena, the fishermen.

New landscape, new connection: the effect of novel ecosystems on ecological networks subcommunities

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The expansion of non-native tree species is leading to the rise of novel ecosystems that may negatively affect biodiversity and ecosystem services. Understanding how such changes affect regional ecological processes is essential. Our study uses spatial multilayer networks to explore dissimilarities in species and their interactions among three common forest types in central Portugal: native *Quercus sp.* forests and non-native forests of *Acacia dealbata* and *Eucalyptus globulus*. We analyzed seed dispersal by birds and pollen transport by birds and insects between these forests, across 15 sites (five per forest type). To assess landscape effects on ecological processes, we identified species modules (subcommunities of interacting species) that form the mesostructure of a network and modeled interlayer link and modules dissimilarity. Sites closer to each another showed more similar interactions in seed dispersal and bird pollen transport networks. Eucalyptus forests were connected by fewer bird species, with more similar partners, leading to higher link similarity. Species and interaction dissimilarity varied by network type, with forest type, study site, and landscape complexity being the most important factors influencing network mesostructure. The extensive presence of novel ecosystems in the landscape appears to negatively impact the functional diversity of birds and insects, disrupting two vital ecological processes for forest dynamics: pollination and seed dispersal.

Importance of the conditioning status on leaf litter decomposition under salt pulse contamination in a manipulated stream

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Stream salinization is a recognized, although understudied, global threat to freshwater ecosystems biodiversity, functions and services that they provide. In our study, we assessed the consequences of salt pulses contamination in a manipulated mountain stream with a salinized and a reference reach, assessing microbial decomposition of conditioned and non-conditioned chestnut leaves, immediately after a period of NaCl exposure (7 consecutive days) and 4 days after salt contamination cessation. Conditioned leaves consistently presented higher mass loss, fungal biomass, and respiration rates than non-conditioned leaves. Leaf conditioning status modulated the deleterious effects of salinization, being more pervasive on the decomposition process of conditioned leaves. The depressing effect on mass loss and associated parameters promoted by daily pulses of salt on these leaves was extended after the cessation of salt contamination, contrary to observed in non-conditioned leaves in either period (potentially higher salt-tolerance of the pioneer species). This suggests salt legacy effects on already established microbial communities promoted by structural changes and/or mycelial physiological adjustments. Such continuous fungal imprint may result in redundant dissimilar (salinization period) or similar (recovery period) fungal decomposing communities able to determine balanced mass loss between sides in each period. Globally, results point to the importance of considering leaf litter quality and salt exposure timing in relation to leaf litter pulses when evaluating the consequences and delineate delineating protection measures for streams facing discrete salt contamination.

Children for Nature: Exploring Environmental Literacy Through Podcasting

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Environmental literacy is crucial for addressing today's biodiversity and conservation challenges. Early childhood is pivotal for developing environmental awareness and a connection to nature. But how can we design strategies that align with young children's interests? This science communication initiative showcases an innovative approach involving 10 interactive sessions, engaging 76 children, aged 3 to 6, in thematic discussions. Each session centred around a specific book that sparked conversation on topics such as biodiversity, sustainable food, marine pollution and children as heroes of nature. By transforming traditional awareness actions into a podcast, we amplified the children's voices to share their perspectives on nature to a broader audience and age groups. After each session, the children illustrated their thoughts on the theme, and these drawings were later used to enhance the podcast experience in video format. The podcast, *Crianças pela terra: o podcast dos miúdos para os graúdos*, aims to extend environmental education beyond the classroom in an engaging way. Although listener numbers are still preliminary, impact evaluation is ongoing. We believe this approach can be easily replicated by schools, fostering continuous growth in environmental literacy.

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The access path to praia do telheiro (southwestern coast of portugal) seven years after an ecological restoration project in a mediterranean environment.

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Will be presented the evolution of the access to Praia do Telheiro affected in 2015 by an excavation more than 50 cm thick made by Camara Municipal do Villa do Bispo (CMVB), eradicating the flora and developing rill and gully erosion.

The 2000 m² area, is a thin decalcified quaternary fossil dune overlaying limestone bedrock, sustaining sclerophyll habitats (5140pt1 and 5210pt2).

Due to soil hardness and declivities until 15%, for a prompt result, it was decided to import fossil sand ground from Castelejo belonging from the same Telheiro's geological formation, to be spread in a very thin layer, on average 7 cm thick. This ground was stabilized with living brush layers, and protected by sowing covered by straw. Lifeless materials were supplied by CMVB, Seeds, live cuttings and seedlings, where locally collected or bought in the local markets. Were installed 90 kg of seeds and 1700 seedlings or live cuttings.

The project was implemented in February and March 2017 involving 40 volunteers coming from seven different countries coordinated by the local association "Proteger Telheiro".

Since the first-year natural dissemination allowed the installation of autochthonous not planted newcomer species; pioneers species, mainly gramineous, in short time disappeared, and the general aspect of the area is like the surroundings. It doesn't appear in the restored area the invasive alien species *Carpobrotus edulis*, that on the contrary is widely presents in the nearby areas.

Climate-driven changes of ichthyoplankton communities in an Iberian estuary – a 13 years study

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Ichthyoplankton assemblages are key components of estuaries worldwide, playing a vital role as nurseries for fish larvae. Nonetheless, estuaries can be highly affected by ongoing climate change. Impacts of climate variability on *ichthyoplankton* assemblages will have consequences for marine pelagic food webs and fish populations biology, namely recruitment. This study aims to investigate the influence of environmental variability on the interannual abundance of *ichthyoplankton* assemblages of the Mondego estuary (Portugal). For this, an *ichthyoplankton* sampling program of 13 years (2003–2015) along six distinct sampling stations was analyzed to evaluate spatial, seasonal, and interannual changes in ichthyoplankton distribution over periods of wet, regular, and dry conditions. The *ichthyoplanktonic* community was dominated by *Pomatoschistus spp.* across all seasons and conditions, with higher larval abundances during summer and spring. The main changes were related to species seasonality and phenology as well as an increase in the number of marine species during extreme events. The larval fish community showed a strong relationship with the regional and local environment over the study, presenting a distinct yet highly variable structure during the 2009–2013 period. Reported changes will likely trigger major changes in species dominance and abundance, with clear ecological and socio-economic implications.

Trophic ecology of the Madeira Wall Lizard throughout Azores archipelago, revealed by stable isotopes

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Human-mediated biological invasions pose significant threats to native insular biodiversity. Reptiles are particularly successful island colonizers, benefiting from reduced competition and predation. The Madeira wall lizard, *Teira dugesii*, native to Madeira and Selvagens archipelagos, recently colonized Azores archipelago. Exhibiting extensive phenotypic diversity and omnivorous diet, in its native range this species is distributed across a wide variety of habitats, from intertidal zones to >1,800 m above sea level. Its impact on Azorean ecosystems remains speculative. Using carbon and nitrogen isotopic signatures, we compared the trophic niches in population from three habitats (urban, coastal areas, high altitude) per island in Azores. In colder high-altitude areas, with lower arthropod abundance, lizards consumed more plant matter, having a more herbivorous diet, which is translated in lower values of nitrogen and lower trophic level. In urban areas populations display higher trophic levels and narrower niche, likely due to the consumption of human-associated resources. In coastal areas, the inclusion of marine invertebrates in the diet, increased trophic level. Since the Azorean biota evolved in absence of native reptiles, the recent and rapid expansion of *Teira dugesii* is expected to induce substantial disruption in the native ecosystems not only by inducing trophic cascades, but also by increasing the connection between marine and land communities.

“Mesophotic Black Coral Forests in Santo Antão, Cape Verde: Biodiversity, distribution, and ecological characteristics.”

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The Republic of Cabo Verde heavily relies on marine resources for its sustenance. Its coastal areas play a crucial role in ensuring the well-being of local population by providing essential resources like food and employment opportunities. Nevertheless, coastal regions are facing significant threats, due to global warming, natural hazards, and various anthropogenic pressures. Thus, there is an urgent need for sustainable development of activity sectors linked to the sea, but the lack of a comprehensive baseline knowledge regarding the environmental condition of Cabo Verde's marine ecosystems poses a considerable obstacle.

Black coral communities create high-diverse forests in shallow and deep bottoms. Serving as "ecosystem engineers", these corals provide suitable habitats, acting as feeding, reproductive, nursery, and refuge areas for a wide variety of associated species, many of which are of commercial interest. Using advanced rebreather diving, we have mapped and characterized black coral communities in 2 locations around Santo Antão (Cape Verde) for the first time in depths until 60m. We used the Mackinnon List Technique (MLT) to compute biodiversity indices for benthic and fish communities shedding light on the intricate relationships between various species inhabiting these mesophotic depths. Preliminary findings indicate a rich and complex ecosystem with unique biological communities, which vary in depth and location.

By providing baseline data on the biodiversity and distribution of black coral forests in Santo Antão, this research will contribute to its protection with efficient management plan recommendations, in line with the needs of stakeholders and local communities.

Shades of green: Exploring biodiversity in different forest areas.

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The central part of continental Portugal is one of the main forested regions of the country and yet the specifics of its community dynamics are vastly understudied in most of its range. The aim of this study was an exploratory, comparative analysis of mammalian and avian diversity in different forest ecosystems occurring at central Portugal via remote monitoring techniques while contemplating implications for ecosystem functionality and service provision. The sampling sites included in the present study design were located in Ansião, Castelo Branco, Lousã and Sabugal, which are characterized by diverse landscape mosaics. Both taxonomic and functional diversity metrics were found to differ significantly between those areas and a high degree of dissimilarity was observed. The results show that the Normalized Difference Vegetation Index is a good predictor of biodiversity, having a positive relationship with tested diversity metrics. Regarding land cover, eucalyptus plantations had significantly lower biodiversity metrics than all other examined land cover classes, such as broadleaf forests or shrublands. The results of the present work offer a baseline for future investigations of finer resolutions, as well as a good indication of the implications of forest management and change to biodiversity conservation.

Integrating Local Knowledge and Scientific Data: Species Distribution and Fishing Effort in NW Portugal

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Understanding species–habitat relationships is crucial for ecosystem-based conservation. Demersal and benthopelagic fisheries, essential for coastal communities, rely on habitats for shelter, food, and reproduction. However, key species continue to decline. While management typically focuses on regulating fishing to protect reproductive capacity, habitat integrity in shallow coastal areas is just as important, especially for juveniles. These habitats face increasing pressure from fishing fleets, affecting their structure.

This study examines the role of habitat complexity and fishing effort in the distribution of demersal and benthopelagic species across coastal habitats, including rocky seabeds, macroalgae formations, and sandy bottoms, along the NW Iberian shelf near Viana do Castelo. Significant differences in species assemblages were found using baited remote underwater video stations (BRUVS). Rocky areas had the highest diversity and abundance, while sandy habitats had the lowest. *Trisopterus luscus*, *Diplodus vulgaris*, and *Ctenolabrus rupestris* were the most abundant species and key to the differences observed between habitats.

This study emphasizes the importance of habitat complexity in sustaining marine life by combining local fishers' knowledge with scientific data. These insights provide crucial baseline data for conservation strategies that ensure the long-term balance between fisheries and ecosystem health in the North East Atlantic.

Disentangling the drivers of canopy greenness trends in the cork oak woodlands of Portugal

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Increasingly frequent and severe droughts in the Mediterranean are reducing water availability compared to the characteristic norm, which will negatively impact key processes involved in tree species' functioning, potentially compromising forest health. The cork oak woodlands of Portugal are relatively drought resistant, however, they have experienced a decline in the last decades in parallel with increasing temperatures and intensifying drought conditions. Therefore, it is important to disentangle the relationship between vegetation and water availability in this region. This study used Boosted Regression Trees to identify the climatic, edaphic, and biogeographical factors influencing trends in cork oak canopy greenness at the regional scale. Results indicated that trends in water availability were the main driver of trends in greenness. Areas experiencing browning had higher browning intensity under drier than normal conditions. Topography played a relevant role, with higher magnitudes of greening predicted on north-facing and hillier slopes. Cork oak forests were influenced by soil permeability and soil thickness, while cork oak agroforests were influenced by trends in spring and growing season climatic water balance. This study highlights the interconnectedness of plant functioning and soil water availability, confirming that a changing drought regime will significantly impact the future health of cork oak woodlands in Portugal.

Contrasting trace elements bioaccumulation in *Hediste diversicolor* and *Scrobicularia plana* from Ria de Aveiro lagoon

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Estuaries, usually serve as direct sinks of toxic elements due to the discharge of effluents caused by anthropogenic activity, suffering from various contaminations like trace elements (TEs) decreasing environmental conditions. The polychaete *Hediste diversicolor* is a bioturbator species and active predator while *Scrobicularia plana* is a deposit-feeding bivalve buried in sediments. Thus, this study assessed TEs bioaccumulation in *H. diversicolor* and *S. plana* collected in eight areas along Ria de Aveiro lagoon (northwestern Portugal). TEs quantification was done through inductively coupled plasma-mass spectrometry (ICP-MS). Overall, spatial variation in TEs concentrations was observed, however, bioaccumulation of TEs was site and species-specific. Manganese (Mn) > Zinc (Zn) > Lithium (Li) > Cerium (Ce) > Rubidium (Rb), were the elements with higher concentrations in sediments. Also, sites with higher organic matter content and percentage of fines had, in general, higher TEs concentration. Regarding TEs bioaccumulation, obtained results showed that, in general, *S. plana* bioaccumulated higher TEs levels than *H. diversicolor*. Moreover, *S. plana* bioaccumulated more Zn > Strontium (Sr) > Mn > Copper (Cu) > Arsenic (As) while *H. diversicolor* bioaccumulated more Zn > Mn > Sr > Vanadium (V) > Cu. This study demonstrated that although these two benthic invertebrate species cohabit in the same environment, organisms' behavior and feeding activity can have a role in TEs bioaccumulation.

Behavioural and biochemical responses of *Hediste diversicolor* under combined polymethyl methacrylate nanoplastics and arsenic exposure

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Coastal ecosystems are pollution recipients, including plastic and metal(loid)s. Arsenic (As) is a toxic metalloid reported to impact physiological, behavioural, and biochemical parameters in marine organisms. Despite the increased awareness on the impacts of plastic pollution, there is a knowledge gap regarding effects of NPs (< 100 nm). Polymethyl methacrylate (PMMA) has been reported to impact the immune response and regeneration of fish and polychaetes, respectively. This study focused on the single and combined effects of sediment spiked with PMMA NPs (50 nm) and As on *H. diversicolor*, analysing behavioural and biochemical parameters. *H. diversicolor* was exposed for 10 days to PMMA NPs (0.5–5mg/Kg) and As (0.625–12.5 mg/Kg), alone and combined. Overall, results showed that the time needed to start burrowing significantly increased in organisms exposed to mixtures of PMMA NPs with 0.625 mg As/Kg, which may lead to higher predators susceptibility. Cholinesterase activity increased in mixtures with low plastic concentrations, which may indicate apoptosis. Regarding sugars, an overall decrease was observed, suggesting lower energy availability for counteracting the effects of contamination. Furthermore, upregulation of the antioxidant defence system was observed but unable to prevent lipid peroxidation in mixture exposures. In conclusion, data highlights the potential increased risk to organisms exposed to the combination of As and PMMA NPs.

Assessing the potential delivery of ecosystem services to support landscape planning, management and decision-making

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Ecosystem Services (ES) is a compelling concept to describe intricate biophysical processes and their socio-economic linkages. Priority in European policy, ES are envisioned as a powerful tool to support landscape planning, management and decision-making. This research assessed the potential for ES delivery in the Alto Minho NUTS III administrative region, northwest Portugal, characterized by an outstanding social-ecological heritage. We implemented a spatially explicit matrix-based approach where land cover classes were linked with ES potential, based on existing literature and expert knowledge, and assessed resulting patterns in the study area. Outcomes disclose a high potential of the territory for delivering pollination (regulation) and cultural services, largely related to land cover diversity occurring particularly within Natura 2000 sites. Other ES services (e.g., carbon sequestration and timber production) were found relevant in the territory. Overall, our results highlight the use of ES mapping and spatial tools and their relevance towards decision-making by contributing to more efficient/sustainable decisions on the use of limited resources and land use planning.

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Diversity of cultivable bacteria and their plant growth-promotion abilities in maize grown under various water regimes

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The application of microorganisms that promote plant growth under arid conditions can significantly reduce crop losses. Plant growth-promoting bacteria can help plants endure adverse environments by encouraging faster germination and higher growth. The aim of the study was identify the changes in the cultivable bacterial community associated with maize root at different water regimes and plant growth stages. In the present study, we collected bacteria from the roots of maize plants at two distinct stages of their life cycle (vegetative and reproductive) under three different water regimes (100%, 50%, and 0% irrigation). We used BOX-A1R-based repetitive extragenic palindromic-PCR (BOX-PCR) to identify unique strains among the 405 isolates we obtained. We subsequently tested these strains for their ability to withstand osmotic stress by using 15% polyethylene glycol 6000. We also tested them for bacterial plant growth-promoting traits, such as the ability to produce siderophores, indol-3-acetic acid, and phosphate solubilization, in both the presence and absence of osmotic stress. The data obtained were used to observe the overall response of the maize cultivable rhizobacterial community isolated at two stages of the life cycle when exposed to osmotic stress. Our findings showed that a higher percentage of endophytic and rhizospheric bacteria were tolerant to osmotic stress during the reproductive phase, and that rhizosphere bacteria showed higher ability to produce alginate and siderophores during this phase. These findings are important to consider when collecting bacteria from different water availabilities, to select bacteria that are effective in enhancing crop resilience in drought-affected regions.

Promoting a sustainable urban development through innovative ecological predictive tools and species conservation strategies

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In the global context of declining biodiversity, land use changes, and climate impacts, effective and optimised management strategies are needed to preserve native biodiversity. Rapid assessments of species and ecosystems are fundamental tools for obtaining accurate and updated distribution data to implement conservation measures under global changes. In Guimarães (Northwest Portugal), a study conducted from 2021 to 2023 mapped species diversity and distribution (amphibians, birds, mammals) and identified areas that require local protection. Using standardized techniques (e.g., visual encounter surveys, camera trapping) and citizen science data (Biodiversity GO, GBIF), the study revealed urbanization and agriculture pressures. The research allowed the development of “Guimarães 2030 Biodiversity Action Plan”, setting long-term conservation goals and proposing Nature-based solutions to increase species conservation in fragmented habitats. Building on previous work, a predictive framework is being developed, combining data acquisition and analysis tools (e.g., remote sensing, statistical downscaling, stochastic-dynamic simulations, spatial projections) within a spatially explicit environment (Geographic Information Systems). Interactive biodiversity distribution maps will be created to forecast species' responses to human interventions under different management scenarios. It represents a key step toward urban biodiversity conservation and can be replicated in other regions.

Soluções Baseadas na Natureza: Recuperação de Ecossistemas Fluviais para Proteção do Património Cultural no Vale do Côa

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O Vale do Côa é conhecido pelo seu extraordinário património arqueológico sendo que a região enfrenta diversos desafios ambientais como as alterações climáticas e a desertificação, tornando essencial encontrar soluções para preservar tanto o património natural quanto o cultural. As soluções baseadas na natureza, como as técnicas de engenharia natural, podem ser a resposta aos problemas ambientais identificados no Núcleo de Gravuras da Canada do Inferno e da Penascosa, no Parque Arqueológico do Vale do Côa. As intervenções têm como objetivo a prevenção da erosão das gravuras durante os episódios de cheias do rio Côa (Penascosa), fixação de sedimentos e restauração de galerias ripícolas, promoção da biodiversidade e aumento da resiliência dos habitats. A utilização de técnicas como faxinas vivas e entrançado vivo oferece soluções eficazes para estabilizar margens fluviais e proteger o património cultural da região, desempenhando um papel crucial na implementação da Lei do Restauro dos Ecossistemas, promovendo a recuperação sustentável e funcional dos ecossistemas degradados. As técnicas de engenharia natural integram práticas que harmonizam a intervenção humana com a regeneração natural. Este estudo exemplifica como as soluções baseadas na natureza podem ser uma ferramenta chave na mitigação e adaptação às mudanças climáticas e na preservação do património cultural e ambiental, reforçando a importância da sua implementação no cumprimento das diretrizes da lei de restauro da natureza.

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Tell me where you go, and I'll tell you where you die: landscape connectivity as a tool to predict amphibian roadkill risk

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Human overpopulation and consequent activities such as habitat fragmentation, land conversion, and linear infrastructure expansion, are currently some of the main threats to biodiversity. Amphibians are especially affected because they depend on both aquatic and terrestrial habitats to complete their life cycles, which can be negatively impacted by roads, due to reduced landscape connectivity. Understanding how animals move across the landscape may improve the prioritisation of sites for the implementation of mitigation measures. We assessed habitat suitability and landscape connectivity for two amphibian species in Southern Portugal. We addressed the following question: Can landscape connectivity predict amphibian roadkill risk? Our results showed that both species' distributions shifted between years. In normal and moderate drought years, habitats with low to medium primary production had the highest occurrence probability, while forested habitats revealed the highest occurrence probability during a severe drought year. Our connectivity models assigned higher current movement corridors to heterogeneous habitats composed of sparse forests combined with low-management agricultural areas and good networks of higher-density water bodies. We found a positive correlation between high-connectivity road sections and roadkill for both species, proving that landscape connectivity can be a valuable tool to predict locations with a higher probability of roadkill.

Incorporating biotic interactions in systematic conservation planning

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Biotic interactions are fundamental to understand species distribution and abundance, ecosystem functioning, and guide conservation efforts. However, conservation planning often overlooks these important interactions. This work aims to demonstrate a new methodology to include biotic interactions into Marxan, a spatial prioritisation tool commonly used for selecting priority areas for conservation. For that, we use freshwater mussels and fish interaction (as mussels rely on fishes to complete their life cycle), in the Douro River basin, as a case study. We also test the importance of including biotic interactions into conservation planning, by running different spatial prioritisation scenarios considering: 1) only the target species (freshwater mussels); 2) freshwater mussels and their obligatory hosts (freshwater fishes); 3) freshwater mussels, fishes, and their interactions (considering areas of potential interactions between them as additional species). We found that biotic interactions tend to be underrepresented when the data on both freshwater mussels and fishes is not simultaneously included in the spatial prioritisation. The low overlap between the priority areas identified here and the current Natura 2000 network, shows that our approach may be useful for establishing or enlarging protected areas, considering the EU Biodiversity Strategy for 2030. Also, this work may provide guidance for the management of main threats to freshwater ecosystems. Acknowledgments: FCT 2020.04637.BD

Wildlife conservation preferences were mainly justified by species attractiveness or profitability, and male, poorer children from rural areas were more likely to correctly identify animal species. The endemic *A. bicarinata* is the only terrestrial mollusc from the islands that has been listed as threatened, and most of its genetic diversity was found on Príncipe Island.

Our results showed that habitat loss and introduced species are important threats to this malacofauna, and that maintaining the integrity of forest ecosystems is critical to preventing invasions, but also that management for conservation will have to consider the relevance of introduced species for people. Urgent in and ex situ efforts are needed to protect the valuable forests where most endemic molluscs persist.

Avaliação dos fatores de risco de colisão de cegonha-branca com linhas elétricas através de seguimento por GPS

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A transição energética requer a expansão das linhas elétricas existentes, infraestruturas que podem causar elevada mortalidade de aves, por serem obstáculos aéreos. O comportamento de voo desempenha um papel crucial no risco de colisão, e o estudo das altitudes de voo permite-nos compreender o que leva as aves a voar a altitudes de risco. Isto possibilita a identificação de áreas, condições e comportamentos de risco das aves, e a implementação de medidas de mitigação pelas empresas de transporte e distribuição de eletricidade. Para identificar os fatores que influenciam as altitudes de voo da cegonha-branca (*Ciconia ciconia*) e melhor compreender o que a leva a espécie a efetuar voos a altitudes de risco de colisão com as linhas, analisámos os dados de seguimento GPS de 34 indivíduos capturados no centro-sul de Portugal. Os principais fatores determinantes da altitude de voo desta espécie foram a hora do dia, a distância a aterros sanitários e a nebulosidade. O risco de colisão aumenta durante as horas crepusculares perto de aterros, em dias de elevada cobertura de nuvens e durante a época de reprodução. Milhares de cegonhas congregam-se diariamente em aterros, aproveitando a previsibilidade e abundância de resíduos alimentares. Alguns destes locais têm uma alta densidade de linhas elétricas, tornando-se pontos críticos, ao nível do risco de colisão, para as cegonhas e outras aves que usam aterros. A implementação de medidas de mitigação da colisão em linhas elétricas será uma prioridade nestes locais, em particular num raio de 1 km em redor do aterro.

Aplicando o conceito de vulnerabilidade dos meios de subsistência no contexto das áreas protegidas, forneço suporte empírico para: i) a vulnerabilidade das famílias aumenta a exposição às IHVS, e as IHVS aumentam a vulnerabilidade das famílias nas áreas protegidas; ii) outras dimensões da vulnerabilidade, como a variabilidade climática, a falta de estratégias de subsistência e as fracas redes sociais entre as famílias, contribuem para a vulnerabilidade geral das famílias nas áreas protegidas; iii) os gestores das áreas protegidas precisam de melhorar a comunicação bidirecional com as comunidades para garantir uma melhor inclusão das comunidades na gestão das áreas protegidas, o que pode melhorar a sua eficácia na preservação da biodiversidade; e iv) a nível nacional, destacou-se a necessidade de gerir as áreas florestais dentro e fora das APs e investir na segurança hídrica das comunidades de forma a reduzir as IHVS.

De forma geral, minha tese contribui com informação e estudos empíricos que substanciam a necessidade de uma visão holística do conceito de vulnerabilidade das comunidades e a sua integração na gestão de áreas protegidas tendo em vista o objetivo de um modelo de conservação mais socialmente inclusivo. Conceptualmente, os meus resultados acrescem ao corpo de evidência de que os problemas sociais e de conservação não podem ser endereçados separadamente, sendo muitas vezes interdependentes. Primeiro, destacando o valor de considerar a integração das IHVS nas análises de vulnerabilidade e de vulnerabilidade nas estratégias de conservação e mitigação dos conflitos entre humanos e animais. Em segundo lugar, evidenciando que a vulnerabilidade e as IHVS são afetados por fatores socio-ecológicos que atuam em diferentes escalas, destacando que são necessárias intervenções de conservação e coordenação entre escalas de atuação. Por último, as redes sociais dos regimes de co-gestão e estratégias de conservação comunitárias em Moçambique podem beneficiar da promoção de uma comunicação bidirecional entre as comunidades e os gestores das APs, para promover o envolvimento ativo das comunidades na conservação.

Effects of deer on the functioning of mediterranean oak woodlands: carbon, water and fire

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Wild ungulates, which populations are expanding across their geographical areas of distribution, can affect the plant species composition, productivity and structure of the plant communities, ultimately altering ecosystem properties and functioning. Here we summarize the effects of deer on the plant community and on the carbon storage, fire hazard and the water cycle of a Mediterranean oak woodland located in Southeast Portugal. We use data from a long-term deer (Red deer, *Cervus elaphus* and Fallow deer *Dama dama*) exclusion experiment and compare fenced plots where deer has been excluded for 7, 12 and 20 years, with control plots where deer maintains grazing and browsing activities. We show that deer changes ecosystem properties with significant effects on the species composition and structure of the plant community. Through reduction of the shrub cover deer significantly reduces the above-ground carbon storage and concomitantly mitigates fire hazard. Additionally, through trampling and reduction of the shrub cover, deer significantly alters water infiltration rates with effects varying with age of deer exclusion. Our results show how wild ungulates can alter the whole functioning of ecosystems suggesting that management of wild ungulate populations must consider multiple effects on ecosystems that may imply synergies and trade-offs.

Diversidade de polinizadores e interações planta/polinizador em diferentes usos do solo da ilha Terceira (Açores)

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As ilhas oceânicas albergam um elevado número de espécies endémicas e interações bióticas únicas que se encontram ameaçadas por diversas atividades humanas, como as alterações do uso do solo e a introdução de espécies. Neste estudo avaliamos a diversidade de polinizadores associada aos tipos de uso do solo dominantes na ilha Terceira – pastagens intensivas, pastagens semi-naturais e vegetação naturalizada – e analisamos as interações planta-polinizador em 30 locais. Não encontramos diferenças na riqueza específica e abundância de polinizadores entre os tipos de uso do solo. No entanto, a análise de redes ecológicas evidenciou maior homogeneidade na composição das comunidades das pastagens intensivas e menor complexidade nas interações planta-polinizador, com a dominância de interações por espécies introduzidas (como a planta *T. repens* e os polinizadores *A. mellifera* e *S. lunata*). Nas áreas de vegetação naturalizada houve maior complexidade nas interações e maior número de interações entre espécies nativas. Estes resultados, quando comparados com os obtidos em áreas de floresta nativa (*laurissilva*), ilustram o efeito das atividades humanas na alteração da composição das comunidades com perdas significativas da biodiversidade nativa, incluindo espécies com elevado valor para a conservação da natureza. É, pois, necessário e urgente, compatibilizar as atividades humanas com a conservação da biodiversidade através de ações de renaturalização e a adoção de práticas sustentáveis.

Este estudo foi apoiado pela FCT através do fundo FCT-UIDB/00329/2020-2024 (DOI [10.54499/UIDB/00329/2020](https://doi.org/10.54499/UIDB/00329/2020)) (TL1 – integrated ecological assessment of environmental change on biodiversity).

Unraveling the mechanisms behind associated biodiversity in alley cropping systems: insights from a simple cell-based spatial model

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The mechanisms shaping biodiversity in agroecosystems and particularly in agroforestry are mostly unknown, difficult to understand and predict, and remain largely elusive and challenging. The relation between planned biodiversity, the species chosen by the farmer, and associated biodiversity, the species that are able to adapt and thrive in agroforestry systems, is outlined by diverse biological, environmental and management variables. Nevertheless, most studies published in this scope rely on case studies within specific biogeographical zones, species combinations and management options, which hampers drawing general conclusions. In order to promote adaptive and resilient agroecosystems within this specific context, we employed a simple modelling approach that compared the biodiversity of various agroecosystems by utilizing dispersed information and implementing a generic parameterisation. The results obtained show the relevance of alley cropping and intercropping to increase the associated biodiversity of agricultural landscapes. Conversely, our simulations suggest that management intensity is particularly detrimental to biodiversity, even when considering the buffer effects of unsprayed trees and understory vegetation. We highlight the importance of further parametrisation, complementary studies and an upgrade of our preliminary approach to guide environmental managers and practitioners in applying the best policies for biodiversity conservation in agricultural landscapes, considering the unpredictable effects of local species pools and ecological and environmental conditions.

Effects of shrub dominance and diversity on Mediterranean oak seedling survival: the interplay of abiotic conditions and plant traits

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Understanding plant interactions is particularly important for the restoration of Mediterranean oak forests, currently facing a severe lack of oak natural regeneration. We conducted a 3-year experimental study in cork oak (*Quercus suber* L.) woodlands in Portugal to assess the effects of species dominance and diversity of the shrub community and associated abiotic resources on cork oak seedling emergence and survival. We sowed 960 cork oak acorns across microhabitats with distinct shrub species dominance and diversity and without shrub cover. We used Bayesian statistics to model emergence and survival as a function of microhabitat type and abiotic variables (soil water and temperature, soil characteristics and leaf area index). The highest survival was observed in microhabitats with higher shrub diversity and the lowest survival in microhabitats dominated by *Cistus ladanifer*. Maximum soil temperature was associated with higher emergence but lower survival in open conditions or with sparser shrub cover. Water logging constrained emergence and survival, but higher soil potassium was associated with higher survival, for all microhabitats. Our study shows that interactions between cork oak seedlings and neighboring shrubs are species and community dependent, and that a more diverse shrub composition improves cork oak seedling survival, likely due to distinct shrub traits that ameliorate the physical environment and promote facilitation.

When wolves and people meet: behavioral characterization of Iberian wolf sightings in relation to humans

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Confident or bold behavior from wolves towards humans has been increasingly reported in several regions of Europe. Understanding the patterns and drivers related to these close-range encounters between wolves and people is crucial for adequate management to avoid critical situations and is being investigated within the scope of LIFE WILD WOLF project. Here, we present data obtained for Portugal, based on the compilation of wolf sightings at close range with detailed information regarding the specific context as well as the behavior of both the observed wolf and the human observer. Data was gathered from official reports and complemented with internet search in news media outlets and social media, considering sightings where wolves were observed in close proximity of humans. A total of 28 observations were compiled, the large majority occurring since 2022 (68%) and reported on social media (82%). Observations of confident wolves occurred mostly during daytime (79%) and in different spatial contexts, including inside urban areas (7%), near buildings on outskirts of villages (18%) or far (> 1km) from urban areas (57%). In most cases, there was no evident attractant (57%), and human observers were located inside a vehicle (61%). Whenever observers became evident (either visually or acoustically), the wolves exhibited avoidance behavior, by fleeing. Based on these preliminary findings, we propose several best practice recommendations for close-range encounters with wolves.

How roads drive mammal-mediated seed dispersal where forest meets the asphalt

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Seed dispersal is critical for plant regeneration, especially in human-modified landscapes. In Mediterranean oak woodlands, rodents and carnivores are key seed dispersers, but the increasing presence of roads and transitional areas between forests and open lands (forest edges) may influence their dispersal patterns. This study assessed how road type (paved vs. unpaved) and road-forest context (edge vs. non-edge) affect seed dispersal by rodents and carnivores in southern Portugal. We tracked acorn dispersal by rodents and fig seed mimic dispersal by carnivores along 12 road sections, comparing dispersal distances, number of seeds dispersed, and crossing rates between road types and contexts. Dispersal distances for rodents were greater along edges and paved roads, while dispersal frequency was not significantly affected. For carnivores, neither road type nor edge influenced dispersal distances, but dispersal frequency was lower at edges and on paved roads. The number of seeds crossing roads was minimal, highlighting their strong barrier effect. Interestingly, dispersal directions varied: rodents tended to move seeds along road verges, while carnivores dispersed seeds from road verges into the forest interior. These findings underscore the complexity of road-forest interactions in shaping species-specific mammal-mediated seed dispersal, with implications for oak woodland conservation and management.

Valuation of Deep-Sea Ecosystem Services - an overview

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Climate change and anthropogenic pressures are negatively affecting marine habitats at a global scale, causing biodiversity loss and negative impacts on ecosystem functioning. The REDRESS and DEEP REST projects aim to provide solutions to restore degraded deep-sea habitats applying ecologically and economically cost-effective protocols. This requires assessing socio-economic aspects of deep-sea restoration, including the potential welfare and economic impact on society from changes in biodiversity, ecosystem service and natural capital value over time. Using scientific search engines, a literature review was performed to identify studies published in the last 10 years relative to cost and benefit analysis of marine ecosystem restoration as well as studies related to potential payment models for deep sea (or related) marine ecosystem services. This preliminary research allowed to quantify and isolate the studies related to the deep-sea to better understand the existing gap associated to this vast expanse of the marine realm. A database compiling all relevant studies and their data was compiled to provide estimates of ecosystem service benefit values accruing to deep-sea restoration activities. On a later stage of the projects, a novel Cost-Benefit Analysis protocol will be developed to evaluate the socio-economic effects of any restoring deep-sea ecosystems.

Horses on the menu: Patterns and drivers for free-roaming horse consumption by Iberian wolves

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In few areas worldwide, horses are a regular wolf prey and comprise most of wolf diet. This is the case in the northern Iberian Peninsula, where wolves positively select autochthonous mountain ponies, which are free-roaming but owned. Yet, patterns and drivers related to wolf consumption of free-roaming mountain ponies are poorly characterized. We conducted a systematic literature review on diet of Iberian wolves with 3 main goals: 1) assess general patterns of wolf diet in areas with or without free-roaming ponies, including geographic distribution, prey consumption (%FO), and seasonal variation; 2) investigate how consumption of free-roaming horses affects consumption of other prey species by wolves; and 3) identify key drivers influencing consumption of free-roaming horses by wolves, in relation to several ecological variables (e.g., altitude, vegetation cover, wolf density, human population density and magnitude of consumption of other prey species). From a systematic literature review were retrieved 37 publications, comprising 137 study sites. Preliminary results from a meta-analysis showed that, in Iberian Peninsula, free-roaming horses are more consumed than domestic and wild ungulates, although depending on altitude, forest cover, pack size and availability of alternative prey. Main findings have crucial implications for livestock management and habitat restoration for wild ungulates, in order to ensure the important ecological role of free-roaming horses as wolf prey.

A relevância do microclima na distribuição das espécies de briófitas

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As diferenças significativas entre macroclimas e microclimas desafiam a nossa capacidade de estimar com exatidão as condições climáticas vividas pelos organismos e, assim, prever as respostas às alterações climáticas. Este estudo tem como objetivo avaliar a discrepância entre o macroclima e o microclima para pequenas plantas, como as briófitas, que são altamente dependentes das condições ambientais locais.

No âmbito do projeto BryoMicroClim, estabelecemos uma rede de colaboração europeia, a fim de monitorizar o microclima que se faz sentir à escala do musgo *Hedwigia striata*, avaliado como quase ameaçado na Europa. Esta espécie cresce principalmente em florestas ou áreas rochosas expostas. Seleccionámos 15 locais de amostragem em toda a Europa e, em cada local, medimos a temperatura do ar perto das populações de *H. striata*, utilizando sensores de campo. Estas medições de campo (microclima) foram comparadas com variáveis de temperatura mensais obtidas a partir do conjunto de dados ERA5-Land (macroclima).

Os nossos resultados sugerem que a recolha de dados microclimáticos em resoluções espaciais finas e escalas temporais longas será fundamental para compreender melhor a potencial vulnerabilidade das briófitas às alterações climáticas e identificar microrefúgios mais vulneráveis a mudanças contínuas nos padrões de temperatura em larga escala.

Saltmarsh Ecosystems as Nature-Based Solutions for Water Quality Management and Climate Resilience: A Case Study from the Lima Estuary

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Saltmarshes are productive ecosystems located at the land-sea interface along sheltered coastlines, providing a diverse range of critical ecosystem services and goods and benefits for society. These include coastal and flood protection, biodiversity conservation, carbon sequestration, food provision, and water purification, among others. Despite their importance, these ecosystems have been subjected to significant degradation due to human activities. Natural wetlands, including saltmarshes, are increasingly recognized as nature-based solutions (NBS) in water management strategies, particularly in regulating the hydrological cycle and improving water quality. Estuarine saltmarshes can help remove organic and inorganic contaminants from surface waters, thereby mitigating the effects of wastewater and other diffuse sources of pollution. In the Lima estuary (northern Portugal), an innovative approach is being implemented that combines the phytoremediation potential of saltmarsh halophytes with pilot revegetation efforts to enhance the uptake and/or biodegradation of contaminants present in sediment and surface water. The saltmarsh's role in mitigating saltwater intrusion and coastal erosion during extreme weather events, under various climate change scenarios, is also being assessed using ecosystem services models. Furthermore, a multi-stakeholder livinglab has been established to raise awareness of the importance of saltmarshes as NBS, aiming to foster community engagement through co-designed activities for the protection of these ecosystems. All these activities are being developed the framework of the Mar2Protect EU project, to showcase the potential of saltmarsh ecosystems in promoting sustainable water management and climate adaptation.

How Does Fire Select Different Land Use and Land Cover Types in the Atlantic Forest?

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Fires are increasingly affecting tropical biomes, yet landscape-fire interactions remain understudied. We investigated fire-proneness—the likelihood of a land use (LULC) type burning more or less than expected—in the Brazilian Atlantic Forest (AF). Using a selection ratio-based approach, we analyzed 40,128 fires over 35 years (1987-2022) across different AF ecoregions. Our findings show that secondary forests, which regrow after disturbances, burned more than expected, while old-growth forests burned less, highlighting an inverse relationship in their fire-proneness. Interestingly, pastures in the AF were less fire-prone than expected, despite being considered highly flammable in Brazil. Other LULCs displayed varying fire-proneness, with regional differences. Over time, fire-proneness in secondary forests decreased, likely due to forest aging and land management changes. We highlight the need for tailored fire management strategies that address vulnerabilities of secondary forests, especially within ongoing restoration efforts. Implementing 'fire-smart' practices and increasing the value of secondary forests to local communities are essential to reduce fire risks. Integrating these strategies with incentive-based programs can improve fire prevention and ensure long-term restoration success. Our study offers a framework to understand fire-landscape dynamics and provides actionable insights to safeguard tropical forests from rising fire threats.

Cascading effects of a seagrass active restoration to rehabilitate coastal ecosystems

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Seagrasses actively protected or restored have the potential as nature-based solutions for rehabilitating ecosystems and mitigating climate change. Their blue carbon is known, while also providing habitat and shelter for a wide range of species. Seagrasses also have the potential to bioremediate contaminants and stabilize sediments. This has driven an initiative to recolonise *Zostera noltei* to remediate the historical mercury (Hg) contamination in a delimited area of the coastal lagoon Ria de Aveiro (Portugal). In this work, we assess the role of recolonized seagrass in promoting local biodiversity and productivity while minimising the impact of historical pollution. To this end, we compared the benthic communities in seagrass meadows, the adjacent buffer zones and the bare mudflats over three years and in two regions: a well-established seagrass as a control region and the transplanted seagrass meadow with historical contamination. Overall, the highest species diversity, abundance and production were observed in the well-established *Z. noltei* compared to all other areas. Historical contamination had some influence, as all indicators were generally lower in that region, yet the seagrass colonization had a positive effect. Some key species such as *Hediste diversicolor*, *Scrobicularia plana* and *Peringia ulvae* showed increasing abundance trends from the bare, adjacent and highest values in the seagrass-covered region, suggesting a succession effect due to seagrass expansion.

Gramíneas naturalizadas: desvendando o papel do clima nos padrões de distribuição na Europa

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As espécies invasoras têm um grande impacto negativo nos ecossistemas, pelo que conhecer os fatores, ainda incertos, que levam algumas espécies exóticas a tornarem-se invasoras continua a ser de enorme relevância. Abrangendo 10 países, da região ocidental do Mediterrâneo Europeu e da Europa Central Ocidental, e tendo como grupo-alvo as *Poaceae* (=Gramineae) inventariaram-se, com base em publicações científicas e em bases de dados online, 478 taxa naturalizados, dos quais quase cinquenta foram reportados como invasores em pelo menos um país. O número de taxa invasores por país quando comparado com o da flora total (incluindo taxa nativos e naturalizados) é baixo (igual ou inferior a 3,2%). Ao limitar as regiões em que as espécies podem habitar, o clima desempenha um papel crucial. A maioria dos taxa naturalizados são oriundos de regiões temperadas quentes. A análise (CCA) do clima nas regiões de origem e nas de naturalização dos taxa permitiu identificar algumas tendências. A localização geográfica (com a latitude como proxy de condições climáticas) parece ter um papel significativo, com os países situados mais a norte a serem os que acolhem um maior número de taxa naturalizados não invasores, enquanto os taxa invasores apresentam um padrão geográfico mais irregular.

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A first look into the functional role of translocated species in the Iberian Peninsula

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Biodiversity is severely threatened by anthropogenic activities, prompting the implementation of conservation measures like species translocations aimed at establishing viable populations and improving species conservation status. However, these efforts are often taxonomically biased, favouring mammals and birds, especially larger, charismatic species attracting more public attention and funding. These species tend to be locally, rather than globally, threatened, addressing regional extinctions over broader conservation priorities.

Translocation decisions often overlook the functional roles of species within ecosystems, potentially neglecting key species that contribute to ecosystem resilience. Understanding the impact of taxonomic bias on the functional representativeness of translocated species is thus critical. The Iberian Peninsula, known for its rich biodiversity and endemism, lacks a systematic overview of conservation translocations, hampering the assessment of potential taxonomic and functional biases. Using a comprehensive database compiled under the Biodiversa 'Transloc' project, we explore if species conservation status drives translocation efforts in the Iberian Peninsula and evaluate taxonomic and functional biases across mammals, birds, and fish. We found a bias toward the order Carnivora among translocated mammals, leading to a preference for large-bodied species. Addressing translocation biases will help minimize their impact, enhancing ecosystem integrity.

Immunological resilience of a temperate catshark to a simulated marine heat wave

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Marine heatwaves (MHW) have recently been proposed as more relevant in driving population changes than the continuous increase in average temperatures associated with climate change. The causal processes underpinning MHW effects in sharks are unclear but may be linked to changes in fitness caused by physiological trade-offs that influence the immune response. Considering the scarcity of data about the immune response of sharks under anomalous warming events, the present study analyzed several fitness indices and characterized the immune response (in the blood, epigonal organ, liver, spleen, and intestine) of temperate adult small-spotted catsharks (*Scyliorhinus canicula*) after a 30-day exposure to a Category II MHW. The results indicated that adult small-spotted catsharks have developed coping strategies for the MHW. Specifically, among the 35 parameters investigated, only the gonad-to-body ratio (GBR) and plasma glucose showed significant increases. In contrast, igm and tumor necrosis factor receptor (tnfr) gene expression in blood cells, tnfr in the epigonal organ, and the number of monocytes significantly decreased. Although a decline in immune function in small-spotted catsharks was revealed following the MHW exposure, energy mobilization restored homeostasis and indicated a shift in energy allocation towards reproduction. Group resilience may be due to the variable tolerance of individuals, the phenotypic plasticity of cellular immunity, thermal imprinting, and/or metabolic capacity of the individuals.

Response of Montado to Climate Change: Impacts on ecological indicators evidenced by drought simulation experiments

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Oak woodlands (montado) are semi-natural agroforestry ecosystems, of high ecological and socio-economic value, found in southern Portuguese drylands. Montado biodiversity largely depends on understory grasslands, which not only serve as pasture for livestock but also deliver key ecosystem functions. These montado ecosystems face growing desertification risks due to increasing aridity and more intense and prolonged droughts coupled with intensifying land-use practices, all of which threaten these grasslands' resilience, compromising the capacity of montado ecosystems to withstand disturbances while maintaining its functions. To assess montado's response to climate change, we conducted drought simulations and analyzed the response of several ecological indicators linked with biodiversity (vegetation composition), productivity (aboveground biomass), and soil parameters (decomposition and others). Following the international Drought-Net protocol, we installed drought simulation devices at three LTsER montado sites along an aridity gradient, simulating moderate and intensive drought in five replicates per site. Here, we present preliminary results two years after implementation. Our findings provide insights into how ecological indicators respond to varying levels of drought, aridity, and inter-annual climatic fluctuations. This knowledge is crucial to inform adaptation and mitigation strategies to promote montado's ecosystem services delivery and resilience to climate change.

Untapping biodiversity assessments: Metabarcoding analysis to characterize marine vertebrate communities in a coastal area

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Environmental DNA (eDNA) is a groundbreaking monitoring tool, highly relevant for marine conservation. For its potential to collect data on the occurrence of biological communities with insufficient knowledge and/or present in areas with difficult access, eDNA acts as a new approach for marine biodiversity assessments. Additionally, DNA metabarcoding enables multi-species detection in environmental samples, providing the opportunity to monitor habitats across different taxa and trophic levels. This approach was applied on the northern Continental Portuguese coast with the aim of characterizing the area in regard to the marine vertebrate community. Seasonal monitoring campaigns were conducted between 2021 and 2024, with seawater samples collected at pre-defined sampling stations. After eDNA extraction, 96 samples were sequenced in an Illumina platform. The taxonomic assignment resulted in the molecular identification of different marine mammal species - e.g. the common dolphin (*Delphinus delphis*), rare fish species - e.g. the sunfish (*Mola mola*), and other teleosts with socio-economic relevancy - e.g. the sardine (*Sardina pilchardus*). In addition to providing relative abundances of fish stocks, the positive detection of fin whale (*Balaenoptera physalus*) is a noticeable result since there are no records available of this species in scientific bibliography for this area. Thus, this work illustrates the major benefits of using eDNA as an assessment tool for ecological studies.

Functional structure of benthic communities in reservoirs is shaped by climate extremes in a semi-arid region

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Extreme droughts are becoming increasingly more frequent, significantly impacting aquatic ecosystems and their biotic communities. Our study aimed to assess changes in the composition and functional structure of benthic macroinvertebrate communities in semi-arid reservoirs affected by extreme droughts and their post-drought periods. Sampling occurred in three reservoirs in Northeastern Brazil during extreme droughts (2014, 2015, and 2019) and post-drought seasons (2021–2023). During the drought, maximum temperatures reached 35°C, while reservoir water volumes only reached 1.9% of their capacity. In the post-drought period, rainfall replenished reservoir levels from 20% to full capacity. These seasonal shifts led to significant changes in community composition and functional diversity, expressed through differences between rare, specialists and generalists' taxa. Overall, generalists and specialists displayed traits that favored their survival across seasons. After the extreme drought, rare taxa became more frequent, expanding the functional space and increasing the functional uniqueness of benthic communities through the presence of uncommon functional traits. While our findings highlight the emergence of new taxa and unique traits that enhance diversity post-drought, these taxa may be more vulnerable to future droughts and be the first to disappear, potentially affecting ecosystem dynamics through the loss of species and their associated traits.

A gestão do pastoreio para restaurar os serviços de ecossistema e promover a resiliência do montado às alterações climáticas

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Os montados são sistemas agro-silvo-pastoris de elevada importância ecológica e socioeconómica, dominando nas zonas semi-áridas do país. Estes sistemas são altamente vulneráveis à desertificação e encontram-se em declínio devido a múltiplos fatores, incluindo as alterações climáticas e o sobrepastoreio. Para avaliar as tendências de degradação no montado, analisámos a variação da produtividade no espaço e no tempo através de dados de satélite. A produtividade média no montado nos últimos 20 anos mostra uma tendência de diminuição com o aumento da aridez, sendo também influenciada pelas características do solo e topográficas, apelando à necessidade de gestão local diferenciada. Há uma resposta desfasada da produtividade da vegetação perene a anos secos, diminuindo no ano seguinte, enquanto a vegetação anual reflete as condições do próprio ano. A elevada resiliência das pastagens dos montados às variações climáticas inter-anuais pode ser comprometida em períodos de seca prolongada, evidenciando a necessidade de investimento no restauro para a sua sustentabilidade. Testámos o impacto de medidas de restauro baseadas na gestão do pastoreio. A reserva de áreas > 1 ha sem pastoreio por 25 anos revelou-se uma medida efetiva de restauro, favorecendo múltiplos serviços de ecossistema. A criação de pequenas áreas sem pastoreio em zonas pastoreadas aumentou a regeneração natural após 1 ano, sobretudo em áreas com menor exposição solar. Os resultados salientam a necessidade de selecionar estratégias de restauro com melhor relação custo-benefício em cada contexto, e escolher a melhor localização para a implementar na propriedade agrícola, tendo em conta a exposição solar e a cobertura arbórea, para maximizar os co-benefícios do restauro.

Disentangling the role of local ecology vs. latitude in thermal tolerance and the influence of cold- or warm-adaptation in phenotypic plasticity in an intertidal goby fish

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As climate change intensifies marine heat waves (MHW), understanding species' thermal vulnerabilities and how they vary among populations with geographical and ecological differences is increasingly important, especially in shallow water environments. *Pomatoschistus microps*, a benthic intertidal fish found along Europe's coasts, frequently encounters temperature fluctuations in Portuguese coastal lagoons. To assess population differences in critical thermal limits (CT_{max}) and thermal tolerance plasticity, we collected *P. microps* from three distinct locations along the Portuguese coast, from South to North: Ria Formosa (Algarve), Península de Troia (Lisbon), and Ria de Aveiro (Aveiro). After a two-week experimental exposure to four temperatures covering their natural range (15, 20-control, 25, and 30°C), we measured CT_{max} and thermal tolerance plasticity, quantified as the acclimation response ratio (ARR). The interaction between population and temperature significantly affected CT_{max}, although this did not differ between populations acclimated to 15 or 30°C. However, fish from Troia had the overall highest thermal tolerance at 20 and 25°C, suggesting that local ecological factors, rather than latitude or average climate, may better explain population-level differences in thermal limits. The Formosa population exhibited the highest ARR, challenging the assumption that organisms from warmer climates have lower physiological plasticity due to proximity to their thermal limits.

Resiliência das pastagens: padrões fenológicos e limiares críticos em face das alterações climáticas

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As pastagens são ecossistemas multifuncionais que sustentam 2x10¹² pessoas em todo o mundo, nomeadamente através do pastoreio de gado. As plantas anuais, predominantes, respondem ao clima através de mudanças na fenologia, o que torna estes sistemas vulneráveis às alterações climáticas. Dado que a fenologia das plantas está subjacente a várias funções ecológicas, prevêem-se alterações na produtividade e na capacidade de fornecer outros serviços de ecossistema. Compreender a relação entre os factores ambientais e os padrões fenológicos é fundamental para uma gestão adaptativa destes sistemas agrícolas, para que mantenham as suas funções ecológicas. Tirando partido de avanços na aprendizagem automática e deteção remota, analisámos a fenologia anual de pastagens ao longo de um gradiente climático latitudinal, de continentalidade e topografia variáveis. Identificámos padrões regionais na produtividade com diferenças significativas no início da estação de crescimento, no dia e valor de pico de produtividade, no final da estação e na produtividade sazonal, e determinámos os factores climáticos, topográficos e edáficos subjacentes: determinantes para os padrões encontrados climáticos, topográficos, edáficos ou outros. A temperatura e a disponibilidade hídrica surgiram como os principais preditores principais da distribuição espacial dos padrões fenológicos. Identificámos relações de limiar entre os grupos fenológicos e as variáveis climáticas, sugerindo potenciais limites após os quais são de esperar mudanças nas comunidades vegetais das pastagens, tendendo para sistemas com períodos de crescimento mais curtos e com menor produtividade. Os resultados contribuem para prever o impacto das alterações climáticas nos serviços de ecossistema associados às pastagens e otimizar a sua gestão promovendo a resiliência.

The impact of transportation Infrastructure on African terrestrial vertebrates

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Transportation infrastructure (TIs) can have significant effects on wildlife, contributing to increased mortality through collisions with vehicles and creating significant barriers to movement which can lead to a reduction of gene flow affecting the dynamic of populations and their persistence in a long term. However, there is a notable lack of information about the impacts of TIs on wildlife in Africa, one of the world's most biodiverse regions.

This study aims to address this gap by systematically examining which species are most exposed to the risks posed by TIs. Specifically, we focused on roadkill rates, avoidance behaviour, and potential barriers to gene flow in African wildlife. Through an extensive literature review covering research published between 2013 and 2024, we analysed 214 scientific papers. Our findings revealed that 744 species are exposed to traffic, with amphibians and small mammals showing the highest roadkill rates. Among threatened species, certain mammals like the Tana River Red Colobus (*Piliocolobus rufomitratu*s) and African elephant (*Loxodonat africana*) show a clear road avoidance behavior and vulnerability to habitat fragmentation from TI. Many species listed as Vulnerable or Endangered by the IUCN, such as the Ethiopian wolf (*Canis simensis*) and Preuss's monkey (*Allochrocebus preussi*), remain underrepresented in road ecology studies. We found several species particularly vulnerable to TI that are not listed in IUCN as threatened by TI. Our study emphasizes the critical need of integrating information from scientific research on road ecology into transportation planning across Africa, where rapid infrastructure growth is occurring.

Uma abordagem multidisciplinar à conservação da árvore mais ameaçada de Portugal – *Quercus canariensis* Willd.

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O carvalho-de-monchique (*Quercus canariensis*) é a árvore mais ameaçada de Portugal Continental com o estatuto de Criticamente em Perigo (CR). As suas florestas estão gravemente ameaçadas por fatores essencialmente associados à alteração do uso do solo, encontrando-se muitas vezes restringidos a áreas de fundo de vale e frequentemente associadas à vegetação ripícola. A somar a estes factores, a hibridação com o carvalho-português (*Quercus faginea*), apresenta-se como uma ameaça adicional.

Seleccionamos sete áreas de carvalho com a presença de indivíduos com morfologia afim de *Q. canariensis*, e dois carvalhais de *Q. faginea*, servindo de referência para a análise molecular e morfométrica. Em cada população foram recolhidas amostras de 12-18 indivíduos, e foi feita a recolha oportunista de bolota para multiplicação por via seminal e varas de indivíduos para enxertia e micropropagação in vitro, com o objetivo de multiplicação de indivíduos puros para criação de pomares para produção de bolota. Por fim, foi recolhida informação espectral e estrutural para analisar as manchas de carvalhais portugueses através do uso de um veículo aéreo não-tripulado (VANT) equipado com um sensor de imagem multiespectral e LiDAR. Os dados de imagem e nuvens de pontos foram posteriormente comparados com dados do terreno para avaliar o estado de conservação de cada mancha (incluindo informação da diversidade da flora, composição, estrutura, perturbações e micro-habitats).

Os estudos moleculares recorreram à re-sequenciação total do genoma (WGS) de 80 indivíduos das nove populações, seguidos de análise bioinformática da estrutura das populações. Os resultados mostraram um padrão geográfico de hibridação em direção aos núcleos de Monchique com as populações periféricas dos vales do Mira e Ribeiras de Aljezur a apresentarem fortes graus de introgressão com carvalho-português. A recolha de bolota permitiu a germinação de cerca de 1558 plantas que irão servir ações de restauro e de criação de meta-coleções em diferentes jardins botânicos e arboreta.

Este trabalho surge como a primeira iniciativa nacional de conservação de plantas com recurso a ferramentas genómicas, combinadas com ferramentas de deteção remota e horticultura aplicados à conservação de uma espécie florestal gravemente ameaçada. Os genótipos de elevado grau de pureza, os métodos propagativos e os estudos de caracterização biogeográfica deverão agora ser direcionados, de forma integradora, para ações de criação de pomares produtores de bolota, ações de restauro e de criação de meta-coleções em diferentes jardins botânicos e arboreta. Esta visão multidisciplinar para o restauro de agrupamentos florestais raros pode ainda servir como modelo a ser usado para os ecossistemas mediterrânicos.

CAPÍTULO 9.3

APRESENTAÇÕES FLASH

O desaparecimento dos amieiros afeta a qualidade e a decomposição da folhada de espécies arbóreas não fixadoras de azoto em meio aquático

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O amieiro (*Alnus glutinosa*) é uma espécie ripária comum. Sendo uma espécie fixadora de N, pode influenciar as características foliares das espécies adjacentes. No entanto, as populações de amieiro estão em declínio na Europa, e.g., devido à infeção por agentes patogénicos. Aqui, avaliamos os efeitos do desaparecimento do amieiro nas características foliares de três espécies não fixadoras de N, e na sua subsequente colonização por microrganismos aquáticos e decomposição em microcosmos por 70 dias. Folhas de carvalho (*Quercus robur*), castanheiro (*Castanea sativa*) e faia (*Fagus sylvatica*) foram obtidas de árvores em plantações mistas com amieiro e de árvores em monocultura (BangorDIVERSE, Universidade de Bangor, Reino Unido), após senescência natural no outono. As folhadas de castanheiro e de carvalho têm características mais recalcitrantes (rácio C/N mais alto e concentração de lignina mais alta, respetivamente) quando provenientes de monocultura do que de plantações mistas com amieiro, enquanto o oposto ocorre para a faia (concentração de lignina mais baixa). Consequentemente, a folhada de carvalho e castanheiro de monocultura suporta uma menor atividade microbiana e decompõe-se mais lentamente do que a folhada de árvores de plantações mistas com amieiro, enquanto para a faia as diferenças entre os dois tipos de folhada são em geral não-significativas. Os efeitos indiretos do desaparecimento dos amieiros nos ribeiros dependem da identidade da espécie não-fixadora de N.

Análise da estrutura florestal para auxiliar na seleção de áreas prioritárias para a restauração da conectividade da paisagem na Bacia Hidrográfica do Rio Turiaçu, Amazônia Maranhense, Brasil.

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O desmatamento no bioma amazônico devido a processos de mudança no uso da terra, derivados de múltiplos fatores socioambientais, tornou-se um tema de interesse para a conservação dos ecossistemas. Essas mudanças são, em parte, consequências da expansão da fronteira agrícola, impulsionada pelo crescimento populacional e industrial, contribuindo para a alteração das propriedades do solo, do clima e da qualidade da água. O objetivo desse trabalho é analisar a estrutura florestal na Bacia do Turiaçu durante os anos 1990, 2010 e 2022, pois essa área é uma excelente candidata para a execução de metodologias que auxiliem na restauração da conectividade florestal, visando a conservação da biodiversidade e da qualidade da vida humana. Diante disso, os dados do Mapbiomas possibilitaram elaborar um mapa da evolução do uso e cobertura da terra e analisar as métricas de paisagem. Através do mapa, identificou-se mudanças significativas na área da Floresta, como a redução e a fragmentação. As métricas de paisagem, medidas no software Fragstat 4.2, mostraram a dinâmica da estrutura florestal. Sendo assim, os resultados destacam a importância da conservação dos remanescentes florestais, além de auxiliar na seleção de áreas prioritárias para restaurar a conectividade florestal. Estes são os resultados preliminares do projeto “Planejamento da restauração de paisagens fragmentadas da Bacia Hidrográfica do Rio Turiaçu, Amazônia Maranhense”, o qual é financiado pela fundação Brasileira CAPES.

Conservação, monitorização e restauro ecológico do hotspot mundial de biodiversidade cavernícola em Portugal

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Debaixo do solo vivem algumas das espécies mais raras, ameaçadas e desprotegidas do nosso planeta. Negligenciados nas principais políticas de conservação, os animais das cavernas apresentam elevadíssimos padrões de endemismo, constituem um património natural único e, simultaneamente, prestam serviços ecossistémicos importantes para a humanidade, sobretudo ligados ao ciclo do carbono e dos nutrientes. Apesar das comunidades subterrâneas estarem isoladas no subsolo; são diretamente impactadas pela poluição e pelas alterações ambientais acima do solo. Recentemente, uma única gruta na zona calcária do Algarve (Barrocal, Portugal) foi identificada como um hotspot mundial para a biodiversidade subterrânea, devido à sua incomparável riqueza em espécies endémicas. Muitas delas são conhecidas unicamente neste local, que enfrenta ameaças, como a urbanização e a degradação das áreas superficiais de influência. Esta condição dita o estudo urgente deste local único, de forma a gerar informações úteis para a sua proteção, bem como um quadro para a sua futura avaliação ecológica e para a restauração de áreas degradadas. Apresentamos a estrutura e resultados preliminares do projeto Barrocal-Cave, que preencherá esta lacuna, estabelecendo as fundações para a conservação deste ponto de acesso da biodiversidade das cavernas de classe mundial. Avaliaremos a sua biodiversidade e estado de conservação, implementaremos um programa de monitorização de grutas a longo prazo e avaliaremos as suas necessidades de restauro ecológico em áreas degradadas da gruta e da sua área de influência superficial. Finalmente, alinhado com as partes interessadas, este projeto irá preparar uma proposta formal para um quadro legal para a proteção deste ambiente único, garantindo a sua sustentabilidade. Este projeto inclui também a implementação de um programa de divulgação específico para aumentar a consciencialização sobre o valor e a singularidade dos ecossistemas subterrâneos como um legado para as gerações futuras.

Shallow Subterranean Habitats in the Iberian Peninsula: mapping their distribution and cryptic biodiversity

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Shallow Subterranean Habitats (SSHs) are a type of subterranean habitat located close to the surface, and characterized by the absence of light, high humidity levels and more stable temperatures than at surface. Among SSH's, the Mesovoid Shallow Substratum (MSS) is a subterranean habitat formed by the erosion of exposed bedrock through the mechanical action of wind, rain and other environmental factors. The resulting rock fragments accumulate on steep slopes, and the air-filled spaces between these fragments are inhabited by cryptic fauna. MSS habitats are protected in Europe by the Natura 2000 network, however, knowledge about their faunal communities and geographic distribution in the Iberian Peninsula remains limited. Furthermore, these habitats are known to be a climatic refuge for several invertebrate species, urging further studies in countries/areas where knowledge is lacking. We have mapped this habitat across continental Iberian Peninsula using remote detection and GIS, and overlapped the mapped distribution with the network of protected habitats to assess its conservation status. Using Portugal as a case study, we surveyed the faunal communities (invertebrate and small vertebrate) of Portuguese MSS, to not only increase knowledge about these cryptic animals but also to understand whether they use this habitat permanently or as a climatic refuge.

Fish in the Hot Seat: Long-Term Effects of Warming in Estuaries

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Understanding how climate change affect key species is critical for species and ecosystem management and conservation. In this sense, long-term monitoring programmes appear as key tools for assessing changes in juvenile fish abundance, growth, and phenology.

Firstly, we analysed the long-term variability of recruitment of *Dicentrarchus labrax*, *Platichthys flesus*, *Solea solea*, *Pomatoschistus microps* and *Pomatoschistus minutus* in the Mondego estuary (Portugal) and related this variability to the dominant environmental factors within the estuary and in the adjacent coastal zone, during a period of 17 years (2003 - 2019). The best model of the dynamic factor analysis (DFA) included three common trends and the effects of estuary water temperature and the Atlantic Multidecadal Oscillation (AMO) index lagged by 1 year, reinforcing the thermophilic nature of recruitment in marine juvenile migrants and estuarine resident fishes.

Secondly, based on otolith microstructure, we described the interannual variability in the timing of hatching period and early-life growth of *D. labrax* juveniles over a seven-year period (2011-17). Using generalized additive models (GAM) water temperature was determined as the main factor driving these interannual changes.

Our results provide key insights on how juvenile marine fishes will cope with a warming ocean in the context of climate change.

Ecosystem services of urban rivers: a systematic review

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Global freshwater ecosystems, particularly in urban areas, face numerous threats that affect hydrological cycles, biodiversity, habitats, and ecosystem processes. These ecosystems have the potential to provide essential services; however, urbanization and high population densities often lead to the degradation of these ecosystems, reducing their benefits. To ensure urban planning that balances development and ecosystem protection, it is crucial to adopt quantitative methods for evaluating the value of urban freshwater ecosystem services. To address this, a systematic review of Scopus publications from 2006 to 2022 was conducted, focusing on ecosystem services provided by urban rivers. The review resulted in 118 selected papers, studying urban river basins, rivers and streams. Key indicators for provisioning services included water and food supply, while regulation and maintenance services centered on water quality and flood mitigation; cultural services were mainly related to physical interactions, education, and aesthetic experiences. Additionally, studies about the economic valuation of urban river ecosystem services focused in the context of potential river restoration, and included public input, highlighting the importance of citizen engagement in managing urban river ecosystems. However, challenges remain, such as the need for more research on urban streams, standardizing indicators, and increasing citizen involvement in ecosystem service assessments.

Is existing legislation capable of protecting urban stream ecosystems in the context of OneHealth?

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Half of the world's population currently lives in cities, leading to significant landscape transformations that affect stream ecosystems. These changes include an increase in imperviousness and water runoff from urbanized surfaces, removal of riparian vegetation, or frequent municipal and industrial discharges, leading to a consistent decline in biodiversity and ecosystem services and creating new challenges for environmental and human health. In the last decades, we observed an increase in water related policies, echoing the growing concern with water safety and freshwater ecosystems degradation. Our aim is to highlight relevant international policies and identify potential gaps that should be tackled to promote the protection of urban freshwater ecosystems and human health in cities. Despite the existence of different agendas at a global level or European directives that can protect them (such as the Water Framework Directive, the Habitats Directive, the Environmental Liability Directive and the Nature Restoration Law), regulation is dispersed, subject to different interpretations, under conflicting interests in the cities management and often do not lead to practical or efficient actions. Therefore, urban freshwater ecosystems would benefit from the establishment of specific legislation that support the action of municipal authorities, protects their biodiversity and safeguards an adequate ecosystem functioning to ensure a safe environment for all city's inhabitants.

Impact of diet on kleptoplastidic sea slugs' lipidome during photosynthetic decline

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Kleptoplasty, an adaptation that allows these sea slugs to retain functional chloroplasts from their algal prey, enables them to use solar energy for survival, especially under nutrient-poor conditions. This study explores the impact of photosynthesis loss in the sacoglossan sea slugs *Elysia viridis* and *Elysia crispata* under different diets, by analyzing how the changes in photosynthetic activity affect their lipid composition. Lipids, essential molecules in membrane structure and integrity, energy storage, and signaling, may play a key role the integration, retention and functionality of chloroplasts within the host cells. Using advanced lipidomics techniques (C18- HR-LC-MS & MS/MS), this study investigated the adaptation of the lipid composition throughout the photosynthetic activity declines, under different feeding and starvation conditions. The results indicated that glycolipids, exclusive molecules of chloroplast membranes, decreased differently in *E. viridis* when fed on different algal species, reflecting that the chloroplast donor affects the ability to retain chloroplasts. Additionally, sterols from both plant and animal origin increased in sea slugs with reduced photosynthetic activity, likely due to chloroplast breakdown. These findings highlight the response of lipid metabolism to environmental stressors, offering insights into the ecological strategies that these photosynthetic organisms employ to cope with changes in algal availability and photosynthetic efficiency.

Mining Activities Exacerbate Nanoplastic Impacts on Freshwater Ecosystem Functioning

Juliana Barros (1) & Seena Sahadevan (1)

The combined effects of mining activities and nanoplastic pollution ($\leq 1 \mu\text{m}$) in freshwater ecosystems pose an emerging environmental challenge. We conducted a controlled microcosm experiment investigating the impacts of nanoplastics (NPs; bare and carboxylated, up to $25 \mu\text{g L}^{-1}$) on leaf litter decomposition and invertebrate leaf consumption, both in reference (Control) and mining-polluted waters. Results revealed a significant impact of NPs on leaf litter mass loss (Three-way PERMANOVA; $p=0.0001$). While control treatment showed significant differences under all conditions, NPs (both types and concentrations), when exposed to metal-contaminated water, demonstrated an adverse effect on leaf litter mass loss. Furthermore, NP concentrations significantly influenced invertebrate leaf consumption (Three-way ANOVA; $p<0.00001$), while water and NP types had no significant effects. Overall, these findings demonstrate that NPs and metal-polluted waters disrupt ecosystem processes, particularly litter decomposition and nutrient cycling. NP concentration emerges as a critical factor in these interactions, highlighting the complex interplay between these pollutants in freshwater environments, emphasising the need for environmental management strategies in mining-affected areas.

Aquatic Fungal Responses to Polystyrene Nanoplastics and Metal Pollution in Streams

Seena Sahadevan (1) & Juliana Barros (1)

Nanoplastics (NPs) have recently become a prominent global concern, attracting increasing attention. Nevertheless, studies on the impact of NPs on freshwater ecosystems, particularly in streams, remain limited. In headwater streams, leaf litter decomposition is a central ecosystem process, primarily governed by aquatic fungi, specifically aquatic hyphomycetes. These fungi serve as essential facilitators for nutrient and energy transfer to invertebrates and higher trophic levels. Despite this critical ecological function, the influence of NPs on litter decomposition processes on aquatic hyphomycetes is underexplored. Additionally, mining activities, which are often a source of metal pollution in streams, further complicate ecosystem dynamics. Metals from mining can disrupt aquatic microbial activities, potentially amplifying the negative effects of NPs. Here, we tested the impacts of realistic concentrations (up to 25 $\mu\text{g/L}$; 70 nm) of bare and carboxyl functionalised polystyrene on fungal reproduction and communities. The results suggested that fungal sporulation (3-way ANOVA) and community multidimensional scaling (MDS) were influenced by the NP types, concentrations and metals. Overall this study provides novel insights on the risks posed by environmentally relevant concentrations of polystyrene NPs and metals on aquatic fungi in freshwaters.

Impact of Polyethylene on leaf litter decomposition in freshwater ecosystems

Sarra Ben Tanfous (1), Juliana Barros (1), Seena Sahadevan (1)

Polyethylene, the most common single use plastic found in products such as plastic bags, bottles, and packaging material is known for its lightweight, flexibility and chemical resistance. Despite its widespread use, studies on the impact of polyethylene on aquatic ecosystems, particularly in streams, is limited. Leaf litter decomposition is a key process in freshwater streams accomplished primarily by aquatic fungi, specifically aquatic hyphomycetes. These fungi act as key intermediaries in transferring energy and nutrients in streams, playing a crucial role in freshwater food webs. However, the influence of polyethylene nanoplastics on the litter decomposition processes in freshwater environments is underexplored. In this study, we tested the effect of environmentally realistic polyethylene nanoplastic concentrations (100 nm; up to 25 µg/L) on leaf litter decomposition in both reference and metal-polluted water. Our results indicated that polyethylene significantly influences the decomposition process, suggesting that it, may pose a substantial threat to freshwater ecosystems by disrupting essential ecological functions.

Serão as macroalgas e halófitas da costa portuguesa uma fonte de compostos antimicrobianos?

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A Resistência Antimicrobiana, causada sobretudo pelo uso excessivo e indevido de antimicrobianos, é classificada pela Organização Mundial de Saúde como uma das 10 principais ameaças à saúde global. A descoberta de novos compostos antimicrobianos não tem acompanhado o surgimento de microrganismos multirresistentes, resultando na diminuição das opções terapêuticas e no aumento da taxa de mortalidade associada a infeções microbianas. Assim, a identificação de novos compostos bioativos com atividade antimicrobiana reveste-se de particular importância. Dada a notável capacidade das macroalgas e halófitas para produzirem metabolitos secundários em resposta às condições ambientais extremas das zonas costeiras, pretende-se avaliar o potencial antimicrobiano dos compostos produzidos pelas espécies que habitam a costa portuguesa. A metodologia envolve a extração de compostos bioativos usando solventes e técnicas de baixo impacto ambiental. Inicialmente, os extratos são testados utilizando o método de difusão em agar com discos contra estirpes bacterianas sensíveis (*Escherichia coli* e *Staphylococcus aureus*) e contra uma estirpe de *Candida albicans*. De seguida, os extratos que apresentam atividade são testados contra uma coleção de bactérias multirresistentes. A avaliação dos compostos produzidos por algas e halófitas da costa portuguesa poderá ter um impacto significativo no combate a infeções multirresistentes, impulsionando o desenvolvimento de alternativas terapêuticas inovadoras.

Poderão as macroalgas e halófitas da costa portuguesa ser uma fonte promissora de compostos antitumorais?

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De acordo com a Comissão Europeia, o cancro é responsável por um quarto das mortes na Europa, sendo a principal causa de morte de pessoas com idades entre os 45 e os 64 anos. Dada a resistência das células cancerígenas, aos fármacos na terapia do cancro, é crucial identificar novos compostos com propriedades antitumorais. Os recursos naturais marinhos, como as macroalgas e halófitas, surgem como alternativas promissoras na busca de compostos anticancerígenos, visto que, a síntese e acumulação de metabolitos secundários é um mecanismo de defesa para superarem as condições adversas existentes nas zonas costeiras. Portugal, com a sua extensa linha costeira acolhe uma diversidade significativa de macroalgas e halófitas, e torna-se uma importante área de estudo. Reconhecendo este facto, pretende-se testar extratos a partir de amostras recolhidas na costa portuguesa utilizando uma linha celular derivada de células mamárias cancerígenas, a MCF-7. A preparação dos extratos segue uma abordagem sustentável e amiga do ambiente, com a capacidade de minimizar o uso de solventes químicos e reduzir a produção de resíduos tóxicos. Os extratos promissores serão também testados numa linha celular derivada de células mamárias normais (a MCF-12A). Assim, este estudo visa identificar novos agentes anticancerígenos, a partir de recursos marinhos, destacando o seu potencial como fontes sustentáveis de compostos bioativos na luta contra o cancro.

Habitat quality and prey presence drive red fox activity patterns and predator-prey interactions

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The red fox (*Vulpes vulpes*) plays a vital ecological role in shaping community structure and ecosystem dynamics, particularly in human-altered landscapes. This study explores the activity patterns and spatial niche overlap between red foxes and their prey in Central Portugal. Using camera traps across four distinct sites (Ansião, Castelo Branco, Lousã and Sabugal), we captured the nocturnal behavior of red foxes and their interactions with two key prey species: the European rabbit (*Oryctolagus cuniculus*) and the Iberian hare (*Lepus granatensis*). Our results demonstrate the red fox's behavioral flexibility, adapting its activity to align with prey presence, thus maximizing foraging success. Likewise, prey species exhibited activity shifts in response to predation risk, underscoring the reciprocal nature of predator-prey dynamics. The study reveals that fox occurrence is strongly influenced by the presence of lagomorphs and habitat quality, measured through the Normalized Difference Vegetation Index (NDVI). These findings highlight the link between prey occurrence, habitat quality, and predator distribution. Our research provides valuable insights into the mechanisms of predator-prey interactions and species adaptability, with significant implications for conservation efforts targeting both habitats and species.

Space and Time: How Red and Fallow Deer Share Their World

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Ungulates, as large herbivorous mammals, hold the power to shape ecosystems, with competition playing a central role in their interactions due to overlapping ecological niches. Such ecological overlap can only be sustained through niche partitioning, typically in temporal and spatial dimensions. Furthermore, the sexual dimorphism in these species, and subsequent sexual segregation, influences activity patterns and space use, which in turn affects interspecific competition. To explore the potential competition between fallow (*Dama dama*) and red (*Cervus elaphus*) deer in Portugal, we used camera traps to capture their activity patterns and spatial overlap. Recognising the importance of sexual segregation, we also examined these interactions separately for males and females. The results revealed a high temporal overlap during the rut season, particularly for fallow deer. However, due to more pronounced sexual dimorphism in fallow deer, this overlap may represent false synchronisation, as males and females, although active at the same time, likely engage in different behaviours. Interestingly, while temporal overlap was high, spatial overlap between species remained low, indicating spatial partitioning as a mechanism to minimise competition, likely driven by resource availability. These insights into how fallow and red deer balance interspecific competition through space and time underscore the importance of considering their interactions in species management and conservation.

Taxas de germinação e crescimento em plântulas de *Quercus suber* sob diferentes substratos: Implicações para a fixação de carbono no Nordeste de Portugal

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O sobreiro (*Quercus suber*) é uma espécie de importância ecológica e econômica que ocupa 22,3% da área florestal de Portugal, totalizando 719,9 mil hectares. O aumento dos incêndios florestais tem colocado em risco a sustentabilidade dessas florestas, como evidenciado pelo incêndio de Picões, em 2013, que devastou 14.000 hectares, incluindo 256,64 hectares de sobreirais. O projeto ForestWaterUp foi implementado para restaurar áreas degradadas, focando-se em 32 hectares nas encostas da albufeira dos Lagos do Sabor, em Trás-os-Montes, concentrando-se na seleção de sementes de árvores adultas, propagação em estufa e reintrodução de plântulas autóctones desta região.

Em outubro de 2023, as sementes de sobreiro foram coletadas de árvores adultas em diferentes áreas agroflorestais não afetadas pelo incêndio, de modo a conservar a diversidade genética da espécie. Após triagem manual e esterilização, as bolotas foram estratificadas a frio (4°C) e posteriormente armazenadas em areia para simular o período de dormência. O experimento decorreu em condições controladas de temperatura (12°C a 29°C) e humidade nas estufas do IPB. De modo a testar a taxa de germinação e crescimento das plântulas em diferentes tipos de substratos foram utilizados dois tipos de materiais: substrato comercial (SS) e composto de bagaço de azeitona (SC), assim como areia (ST) como controlo.

A taxa de germinação foi significativamente maior no substrato comercial (SS), seguido pelo SC. A taxa de crescimento foi monitorizada por 238 dias, com o SS apresentando a maior média. A taxa de sequestro de carbono observada foi de apenas 0,041 g/dia para ST, enquanto para SC e SS foi de 0,046 g/dia. Em relação à biomassa, o SS apresentou os maiores valores para o comprimento das raízes principais e secundárias, sugerindo um desenvolvimento radicular mais robusto. O substrato SC demonstrou a menor produção de biomassa radicular, mas apresentou a maior eficiência hídrica, o que pode ser uma vantagem em ambientes naturais sujeitos a estresse hídrico. Já o ST apresentou a maior biomassa total e biomassa de raízes primárias, apesar de seu crescimento aéreo e radicular ser inferior ao dos outros tratamentos.

A combinação entre eficiência hídrica e fixação de C é fundamental para a sustentabilidade das florestas mediterrâneas. O uso de composto de bagaço de azeitona (SC) como substrato na reflorestação, pode aumentar a taxa de sobrevivência das plântulas de sobreiro, otimizando o uso da água e promovendo a fixação de carbono, além de contribuir com a economia circular. Isso contribui tanto para a recuperação das florestas nativas quanto para a mitigação dos efeitos das mudanças climáticas. Estudos futuros irão investigar o desempenho de plântulas quando transplantadas para condições naturais, com o objetivo de avaliar seu comportamento sob estresse hídrico.

Palavras-chave : biomassa, eficiência hídrica, sequestro de carbono, composto, bagaço de azeitona, economia circular.

Biocontamination in marine and brackish marinas of North Portugal

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The number of recreational marinas has increased in recent years due to the growing demand for leisure boating. Marinas are hotspots of non-indigenous species (NIS) that are regarded as a source of biocontamination (BC) for ecosystems. However, little is known about the influence of salinity on NIS communities.

To explore the effect of salinity on BC level and NIS community structure, fouling assemblages associated with floating pontoons were studied in marine and brackish marinas of North Portugal. A total of 159183 individuals and 217 taxa were found. Of these, 24 species correspond to NIS. Results showed that NIS assemblage structure was affected by salinity. Indeed, NIS richness and the ratio NIS richness/total richness were significantly lower in brackish marinas than in marine ones. Regarding the BC levels, Site-specific Biocontamination Index (SBCI) values also varied significantly between both studied habitats, with higher BC levels in the marine environment. According to SBCI values, the ecological status of brackish marinas was good/moderate whereas it was moderate/poor in marine ones.

Our study provides, for the first time, data on NIS abundance, richness and BC levels in marine and brackish marinas of North Portugal. These data should be considered when developing NIS monitoring programs.

Occurrence of drought in the Guadiana and its impact on phytoplankton biomass

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In recent years, drought periods have become more common and intense and can impact the levels of nutrients in an environment as reduced water input and increased evaporation will elevate the concentration of the nutrients present which can alter the phytoplankton population dynamics. The Guadiana estuary is in a region hit by drought, and it is important to determine the impact that this has on the phytoplankton communities. This can cause harmful algal blooms and affect regional fisheries and tourism. To evaluate drought impact, water was collected from the tidal freshwater zone in 2008, and 2022 and evaluated in microcosm experiments under different nitrogen and phosphorus regimes. Chl a data was collected and compared between the two sample years. To determine the occurrence and severity of the drought in the Guadiana, a Standardised Water Supply Index (SWSI), and a Standardised Drought Index (SDI) were used between 2006 and 2024. The difference between the two indices and the separated normalised components of the SWSI show that the reservoir levels at the Alqueva dam are affected by regional drought however, flow management practices have mitigated downstream drought impacts, and so this is not the cause of differing Chl a levels between the two periods. It is important to study flow management at the Alqueva dam and see if it can be applied to other, drought affected estuaries. Furthermore, it is important to understand the cause of changing Chl a in the region.

Impacts of environmental factors on endangered amphibians *Chioglossa lusitanica* and *Rana iberica* occurrence and abundance in the Lousã Mountain

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Amphibians are among the most threatened taxa globally, particularly due to habitat degradation exacerbated by climate change. Climate change disrupts the flow patterns of riparian habitats, affecting water availability critical for amphibian reproduction and survival. Pollution, drought, and altered hydrology threaten the habitat stability these species rely on, reducing their chances to adapt to a rapidly changing environment. In the Lousã mountain, located in the center of Portugal, on the edge of their range, the endemic and endangered *Chioglossa lusitanica* and *Rana iberica* face increased threats from changing environmental conditions. Here, we try to predict their abundance in relation to selected environmental variables. Preliminary results showed that water temperature and dissolved oxygen are influential predictors of *R. iberica* abundance, whereas *C. lusitanica* is influenced by altitude and water temperature. PCA analysis reveals shared environmental predictors, with altitude, road distance, and air temperature being significant across transects for both species. Conservation efforts in Lousã should focus on maintaining water quality, regulating forest management to prevent fire-induced contamination and preserving stream habitats. These actions are crucial for safeguarding not only the present herpetofauna but also other species sharing their ecosystem.

Environmental Drivers of Structural and Functional Patterns in Macrofaunal Communities on the NW Iberian Coast

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Understanding the dynamics of biological communities is a fundamental step for implementing efficient conservation and management measures. Here, we examine the structure of subtidal macrofaunal communities on the NW Iberian coast, focusing on their interplay with environmental factors (e.g. depth, hydrodynamics) using a standardised approach. These organisms support crucial ecosystem services, serving as integral components of biogeochemical cycles. Our findings reveal no significant influence of depth on the functional structures of the communities. Instead, community structure varied significantly by site. Site 1, under deep low hydrodynamic energy, was dominated by sessile suspension feeders which support biomass growth. Site 2, under deep high hydrodynamic conditions, supported various feeding methods, reflecting environmental quality. Both sites exhibited long life spans and strong dispersal, indicating stable environments. Sites 3 and 4, set in shallower conditions, showed a significant presence of burrowers, reflecting higher sediment reworking and nutrient cycling, contributing to dynamic sedimentary environments. However, site 3, with high energy hydrodynamics, supports more diverse communities while site 4, with low hydrodynamic energy, fosters opportunistic species and lower dispersal capacity. Understanding these patterns within an environment with significant ecological and economic importance holds profound implications for preserving ecosystem services.

Evolutionary history of the house mouse in Cabo Verde

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Biological invasions on islands provide unique opportunities to study evolutionary processes. Also, understanding the colonisation and radiation of introduced species is a priority for biodiversity conservation. Given that the Cabo Verde Archipelago is located in a biodiversity hotspot, it is important to study the impact of the introduced house mouse, *Mus musculus*, in more detail and to understand its colonisation history, diversification patterns and adaptation to these new environments. In Cabo Verde, the origin of this alien species and its adaptation to the islands are mostly unknown, even with preliminary genetic studies. Therefore, this work aims to provide information on the colonisation and diversification patterns of house mice in Cabo Verde as a model for other more complex systems. Phylogenetic and population analyses were performed by amplifying mitochondrial DNA, D-loop, from stomach tissues from seven islands and one islet. Additional morphological analyses were carried out using photographs of more than 100 individuals, to test coat differences across islands. The results showed the recent colonisation of the archipelago by *Mus musculus* from multiple origins. Also, different morphological groups were identified, probably due to the isolation of the islands and the rapid adaptation capacity of this species.

The Role of Life Stages in the Sensitivity of *Hediste diversicolor* to Nanoplastics: A Case Study with Poly(Methyl)Methacrylate (PMMA)

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Plastics are significant drivers of habitat alteration, particularly in coastal ecosystems, due to human activities. The low biodegradability of plastics leads to persistent pollution, making these some of the most persistent pollutants affecting wildlife. This study aimed to assess the role of life stages in the effects of poly(methyl)methacrylate (PMMA) Nanoplastics (NPs) (~513nm) on *Hediste diversicolor*, an important polychaete species in estuarine and coastal food webs. Behavioral and biochemical endpoints were assessed in juvenile and adult organisms after 10 days of exposure to spiked sediment (between 0.5 and 128 mg PMMA NPs/Kg sediment). In terms of behavior, results showed that juvenile stage is the most affected since these needed more time to burrow when compared to adults. A decrease in burrowing capacity increases their vulnerability to predators and also leads to less sediment mixing. Protein carbonylation was observed in juveniles, showing that despite the activation of antioxidant enzymes, they were inefficient against PMMA NPs' effects. Adults, however, did not portray protein carbonylation and lipidic peroxidation, showing that, when developed to this stage, their antioxidant enzymes were able to counter PMMA NPs. Overall, the data reveal the potential of PMMA NPs to affect behavior and induce toxic effects in *H. diversicolor*, with higher effects in juveniles, an important life stage for maintaining populations.

Sessile assemblages in marinas of North Portugal. Brackish vs Marine habitats

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Artificial structures such as marinas have globally increased in response to tourism and recreational activities. Understanding about the function of floating pontoons in marinas as habitats, under different environmental conditions, is essential to support management issues.

This study aimed to test the effect of the habitat where marina is placed (brackish vs marine) on the structure of sessile fouling assemblages on floating pontoons. To achieve this aim, 6 marinas were selected in the North of Portugal, 3 in marine habitats and 3 in brackish ones.

A total of 76 480 individuals or colonials and 89 species were found. The total abundance and the richness were significantly greater in marine habitats than in brackish ones. Moreover, the structure of the sessile assemblage was also significantly affected by the habitat, being the dissimilarity between marine and brackish assemblages 81%.

Our study delivers quantitative data on fouling assemblages in marine and brackish marinas of North Portugal. In view that, the number of marinas will continue to increase in the future, these data could be useful to future monitoring programs and to provide support for decision-makers in order to choose the best localities to marina construction.

Ecosystem engineers influence the structure of vagile assemblages in marinas under different environmental conditions

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The presence of recreational marinas has worldwide increased. Their construction includes floating structures to facilitate the boat mooring, providing new substrata in coastal areas, which can be used by fouling assemblages. However, most of the studies have focused on sessile assemblages and little is known about the influence of ecosystem engineers (EE) on vagile assemblages.

In this study, fouling vagile assemblages associated with floating pontoons were studied in 6 recreational marinas of North Portugal: 3 under marine conditions and 3 in brackish ones. Moreover, the abundance of the EE *Mytilus galloprovincialis* was also assessed. A total of 82 703 individuals and 128 species were found. The EE was present in marine and brackish marinas however, its abundance was higher in marine conditions. Regarding the structure of vagile assemblages, our results showed a significant relationship between EE abundance and assemblage structure. Nevertheless, even given variation among vagile assemblages due to EE abundance, significant differences were still detected between marine and brackish marinas.

Our study contributes to understand how EE and salinity shape the structure of vagile assemblages in marinas. These data could be useful to minimise the impact of artificial structures on ecosystems.

Wildfires and their effect on the Lizards' Diet

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In recent years, there have been significant changes in wildfire regimes, including increases in fire frequency, severity, and affected areas. While fire is known to shape plant communities, its impact on animals, especially predator-prey dynamics, remains understudied. In this study, we assess the impact of fire on the diet of the wall lizard *Podarcis lusitanicus* using a well-documented fire regime in Portugal. Faecal samples were collected from lizards in recently burned sites, sites burned around 8 years ago and sites unaffected by fire. The lizards' diet was analysed using a metabarcoding approach, employing high-throughput sequencing. As a generalist species, *P. lusitanicus* exhibits dietary flexibility, and our research reveals that while the overall richness of its diet remains unaffected by wildfires, significant shifts occur in the composition of its consumed prey. The results show the resilience of the species and its ability to adapt to environmental changes induced by fires. The subtle variations in diet composition indicate that ongoing ecological transformations are taking place. This study further demonstrates the advantages of using DNA metabarcoding over traditional morphological methods, offering a more precise understanding of predator-prey dynamics and ecological interactions in fire-affected ecosystems.

+Biodiversity@CIÊNCIAS: Four years mobilizing CIÊNCIAS community for the improvement of the campus biodiversity and livelihood

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+Biodiversity@CIÊNCIAS aims to promote biodiversity knowledge and empower Faculty of Sciences community to improve sustainability in the University of Lisbon by assuming biodiversity as the pillar sustaining ecosystems and their services. The project monitors biodiversity over time on the campus, with the support of all “Science community” (as students, researchers and local citizens).

Using traditional monitoring methods and the citizen science platform BioDiversity4All/iNaturalist, the project saw observers grow from 81 to 689, observations from 675 to 12,566, and species from 255 to 1,421, from September 2020 to September 2024.

Four user categories —Naturalists, Researchers, Students, and Others— were created to assess the initiative's impact on the observer community. Throughout the study, we saw a significant increase in the number of daily observations made on the platform for all groups, but especially for Students and Researchers. Additionally, we found that while Researchers, Others, and Naturalists registered outside of the +Biodiversity@CIÊNCIAS project area, many Student observations were only documented on campus.

Our findings indicate that citizen science has a great potential for increasing interest in biodiversity among the university community and the public. Citizen science is thus a perfect tool for addressing societal engagement in biodiversity conservation in the face of an unprecedented biodiversity crisis.

Bloom and Bite: two congeneric *Utricularia* species with distinct reproductive strategies

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Under the current global changes and dramatic biodiversity loss, conservation takes on a crucial role for protecting nature. However, conservation set grounds on knowledge about species biology and ecology. The genus *Utricularia* L. consists of a group of carnivorous plants with several threatened species, whose flowers are seldom observed, leading to a poor knowledge about sexual reproduction, a key component of the plants life cycle. In Portugal, two free-floating, native and vulnerable species from this genus, *Utricularia gibba* L. and *Utricularia x neglecta* Lemn., coexist in mostly isolated, acidic and oligotrophic ponds. They differ greatly in size, with *U. x neglecta* producing significantly larger flowers than *U. gibba*. This study aimed to characterize the flower biology and reproductive strategies of both species and assess their implications for population dynamics. We examined floral morphology and physiology, reproductive system and the influence of animal visitors and pollen origin on the reproductive fitness, comparing the results between species. Despite sharing the same habitat, the two species exhibit distinct reproductive strategies, pollination traits and natural sexual fitness. Surprisingly, *U. x neglecta*, which invests heavily in floral attractiveness, was found to be sterile, while *U. gibba*, with less resource investment, remains fertile. These findings provide important insights for the understanding and conservation of these threatened species.

Poluição de plástico nos rios portugueses, uma ameaça crescente

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Nas últimas décadas, o estudo da poluição dos plásticos tem-se centrado nos ecossistemas aquáticos marinhos. Contudo, a atenção sobre os ecossistemas de água doce tem vindo a aumentar, devido à influência dos rios no transporte de macrolixo para o mar. O objetivo deste trabalho foi quantificar e classificar os resíduos de macroplásticos observados na Bacia hidrográfica do Cávado. A identificação, caracterização e quantificação dos macroplásticos foi efetuada por observação de resíduos flutuantes no leito do rio, e do aprisionado nas margens adjacentes. Paralelamente, foram identificadas as possíveis fontes de entrada destes contaminantes nos ecossistemas aquáticos e caracterizadas as pressões da densidade populacional e o uso do solo. Os resultados mostraram elevada presença de resíduos no curso do rio e nas margens sendo que o plástico foi o item mais encontrado. Nas margens, registou-se uma maior densidade de resíduos nos tributários do Cávado, entre eles o rio Tojal (média de 1.1331 ± 0.141 itens/m²). De seguida, o rio Casal de Mato (0.991 ± 0.3747 itens/m²) e o rio Homem (média de 0.4815 ± 0.5157 itens/m²). Regra geral observou-se o aumento do número de itens de montante para jusante (maioritariamente proveniente de atividades agrícolas e antrópicas) que pode estar associado à passagem pelos aglomerados populacionais e à diversidade de uso do solo.

Cânhamo Industrial como Solução Ecológica: O Caminho para a Sustentabilidade Ambiental

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O género *Cannabis* compreende um grupo de plantas herbáceas anuais pertencentes à família Cannabaceae que, desde há milhares de anos, são utilizadas para fins terapêuticos e recreativos. Apesar da cultura da cannabis estar associada à produção de compostos para fins medicinais e recreativos, atualmente o cultivo desta planta está associado à indústria têxtil, produção de biocombustível e ao setor cosmético. No caso do cânhamo (*Cannabis sativa* L.), o seu destino é industrial, principalmente para a produção de fibra. Para além disso, este cultivo tem uma série de vantagens ecológicas: a) sequestro de carbono – reduz a pegada ecológica devido ao seu rápido crescimento, absorvendo entre 8 a 15 toneladas de dióxido de carbono por hectare ao ano; b) introdução na rotação de culturas e melhora a biodiversidade – graças ao seu ciclo curto pode incorporar-se a culturas de rotação como os cereais e as leguminosas, ajudando a quebrar o ciclo de pragas e doenças, o que reduz a necessidade de utilização de produtos fitofármacos; c) melhora a estrutura e a saúde do solo – a cannabis possui um sistema radicular profundo, o que ajuda a descompactar o solo e a melhorar a sua estrutura, tornando-o mais resistente à erosão e melhorando a infiltração da água e a disponibilidade de nutrientes; d) requer poucas necessidades e baixo consumo de água – requer pouco fertilizante e produtos fitofármacos e requer menos água que a cultura do algodão e do milho; e) fitorremediação – elimina compostos como pesticidas e metais pesados do solo e da água; f) produção de biomateriais renováveis – a biomassa residual do cânhamo pode ser utilizada como matéria prima para a produção de biocombustíveis. Todas estas vantagens ecológicas dependem, também, das práticas culturais que devem ser adequadas à cultura.

Estrutura biométrica, dendrocronologia e modelos de crescimento de *Juniperus navicularis* Gand., um zimbro endêmico e ameaçado

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Juniperus navicularis Gand., é um zimbro endêmico do sudoeste da Península Ibérica, que ocorre ao longo dos sistemas dunares costeiros. É uma espécie arbustiva e ameaçada, que se distribui principalmente ao longo da bacia do Sado e do Tejo, sobre solos arenosos. Atualmente, os zimbrais de *Juniperus navicularis* encontram-se fortemente ameaçados, sobretudo pela destruição e fragmentação deste habitat, resultantes do desenvolvimento turístico e agrícola nas suas áreas de ocorrência. A esta situação acresce o facto de não se observar germinação de origem seminal nas populações locais, mantidas apenas por propagação vegetativa. Apesar das ameaças e do elevado valor biológico associado a esta espécie, são escassos os estudos que se debruçam sobre *Juniperus navicularis*.

Nesta comunicação apresentam-se os resultados obtidos numa tese de mestrado feita na Universidade de Évora e realizada no âmbito do projeto Zimbral for LIFE. O principal objetivo desta tese foi estudar a estrutura etária e biométrica das populações de *Juniperus navicularis*. Para tal, estudaram-se as relações biométricas e desenvolveram-se modelos de crescimento para a espécie, através de métodos dendrocronológicos. Os resultados mostram que o *Juniperus navicularis* apresenta um crescimento muito lento e que a população nacional está longe do seu desenvolvimento estrutural máximo.

Characterizing plant communities and soil functioning in mountain land uses of central Portugal

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Within the scope of the project Horizon Europe wildE project (GAP-101081251), ecological restoration and rewilding options are being studied for mountainous landscapes of central Portugal. For this purpose, eight land use categories were selected based on their prevalence at altitudes above 350m in the districts of Aveiro, Castelo Branco, Coimbra, Guarda and Viseu, namely (1) sparse and low vegetation, (2) short shrublands, (3) tall shrublands, (4) native broadleaf forests, (5) conifer plantations, (6) eucalypt stands, (7) copses of *Acacia* spp., and (8) riparian gallery forests. Field data was collected in the spring of 2024 targeting both vegetation and soil components to estimate the contribution of each land use for (i) biodiversity conservation, (ii) carbon sequestration, (iii) risk mitigation, and (iv) production issues. This work describes the experimental design and sampling protocols used for analyzing and comparing the structure and composition of plant communities, and soil biodiversity and carbon stock across land uses.

Os 5 Desafios COOP CORTAderia: cidadãos cientistas contribuem para a gestão de plantas invasoras

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As invasões biológicas são uma das principais ameaças à biodiversidade e promovem prejuízos económicos e na saúde humana. A sua gestão é essencial e deve incluir os cidadãos já que estes introduzem e disseminam espécies, mas podem também participar na prevenção, no registo e no controlo destas espécies.

Os "5 Desafios COOP CORTAderia" decorrem no ano letivo 2024/25, no âmbito do LIFE COOP Cortaderia, e pretendem envolver equipas em escolas, escuteiros, e outras entidades que trabalham com o público jovem, na dinamização de atividades de ciência cidadã que aumentem o conhecimento científico e melhorem a gestão de espécies invasoras. Três desafios focam-se na deteção de espécies e na recolha de dados de distribuição e do ciclo de vida de plantas invasoras, destacando Cortaderia selloana. Os outros dois têm uma abordagem mais inovadora desafiando as equipas a comunicar ciência sobre espécies invasoras, e a controlar estas espécies no terreno. Os "Desafios" são divulgados a nível nacional e esperam aumentar tanto a recolha de dados, ao longo do território, como a sensibilização para o problema. Espera-se detetar novos núcleos de C. selloana, e de outras espécies invasoras, em zonas sem registos, facilitando um planeamento mais estratégico.

Os resultados serão analisados em termos da quantidade e distribuição dos participantes, dados científicos recolhidos, áreas controladas e eventos de comunicação.

Contrasting relationships between wealth and ecosystem services in invaded urban bird communities

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Several studies have shown that areas of cities with higher socioeconomic status have higher levels of taxonomic diversity than poor areas, which represents a form of environmental injustice. There is a knowledge gap in translating this inequality in terms of the ecosystem services that urban biodiversity provides. Our study tested whether functional diversity associated with avian cultural and regulation ecosystem services varied along the socio-economic gradient of urban areas in the Iberian Peninsula. We used bird atlases from Spain and Portugal to characterize the invaded and non-invaded bird communities of urban areas at a 10x10 km scale. For each community we calculated the species richness and Functional Dispersion of cultural and regulation ecosystem services. We then modelled these variables with GLMMs to understand the influence of socio-economic status and the invaded/non-invaded characteristics of each community. We found similar trends in Spain and Portugal, both cultural and regulation ecosystem services being negatively affected by socio-economic status, while species richness followed the opposite trend. Invaded communities showed higher species richness and cultural ecosystem services than non-invaded communities. Our results suggest a contrasting relationship between socio-economic status and ecosystem service provision. Moreover, non-native species seem to play a major role in shaping this relationship, at least for cultural services and species richness.

Assessing reptile microbiome resilience to wildfire

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The increasing frequency and intensity of forest fires have significantly altered ecosystems, creating open spaces with early successional vegetation. In these environments, species adapted to mature habitats may decline, while those suited to disturbed areas can find new opportunities. One such species is the lizard *Podarcis lusitanicus*, native to northern Portugal, a region with high fire activity in recent years. This species thrives in fire-altered landscapes, utilizing features like rocks and boulders that become more prominent.

Host-microbiota interactions are critical to the ecology and evolution of both the host and its microbial communities. Traits such as diet, phylogeny, and social behavior, along with external factors like prey availability and environmental conditions, influence the composition and diversity of gut microbiota.

In this study, we assessed how fire affects the gut microbiota and physical condition (e.g., weight, snout-vent length) of *P. lusitanicus*. Lizards were sampled from four locations, each with areas burned in 2022 and 2016, along with nearby unburned regions, totaling 12 sites. Cloacal swabs were collected, and bacterial communities analyzed using a metabarcoding approach targeting the V4 hypervariable region of the 16S rRNA gene.

With increasing wildfire intensity, this study offers key insights into how fire-driven environmental changes influence the biotic interactions between lizards and their gut microbiota.

Avanços e desafios da agenda verde brasileira: vez (e voz) aos jaguares, pumas e sertanejos

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O Brasil almeja a liderança mundial na geração de energia de bases renováveis. Entre 2018 e 2023 o país teve um aumento de 700% em parques, complexos e geração de energia, colocando-o nas sexta e oitava posições do ranking mundial da produção de energia eólica e solar, respectivamente. A Caatinga, Floresta Tropical Sazonalmente Seca, segundo bioma brasileiro mais vulnerável às mudanças climáticas, contribui com 1/5 da produção nacional de energia. Os sítios de elevado potencial sobrepõem-se a áreas chave de conservação da biodiversidade e de populações humanas vulneráveis. Jaguares e pumas são predadores topo de cadeia e estão regionalmente ameaçados de extinção. Acrescem às ameaças históricas (caça, destruição de habitat) novos usos do solo, que geram controvérsias 'green-on-green', para a ecologia desses felinos, suas presas, habitats e modos de vida tradicionais de moradores em áreas naturais. Investigação pioneira conduzida no Boqueirão da Onça, Norte do Estado da Bahia, incluiu captura e monitorização de um jaguar e um puma, e entrevistas a moradores locais, para identificar impactos da etapa de instalação de empreendimento eólico sobre pessoas e fauna. Os resultados, fundamentados na Ecologia e nas Dimensões Humanas, reforçam que a transição energética justa precisa criar modelos que incluam todas as ciências, agentes sociais e variáveis na tomada de decisões, e não apenas ponderar aspectos técnicos e econômicos, ampliando a desigualdade, a degradação e os conflitos.

Sharing blood parasites: Infection dynamics on two sympatric wall lizard species (genus *Podarcis*) across 10 years

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Regarding parasite infection dynamics, the effects in host and parasite responses are often shaped by a multitude of biotic and abiotic parameters that can act as confounding factors when trying to understand parasitic associations. Cases of phylogenetically related species living in sympatry can provide excellent opportunities to delve into parasitism studies while minimising some of these variables. In Moledo, northern Portugal, we have sampled populations from two species of *Podarcis* who live in this situation and share blood parasites of the Adeleorina and Eimeriorina orders. Samplings were conducted between 2011 and 2013, and again in 2021, during which parasite prevalence and intensity were also recorded. Preliminary results indicate a significant decrease in prevalence of infection, with a reduction of almost 50%, and by further analysing this infection data together with climatic data for the region across this time period, we aim to better understand parasite infection dynamics and the factors that shape them across time.

Revisiting the distribution and unveiling the feeding preferences of the weevil *Stenopelmus rufinasus*, a biocontrol agent for *Azolla filiculoides* accidentally introduced in Portugal

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Azolla filiculoides Lam. (*Salviniaceae*) is a widespread invasive alien aquatic fern with negative ecological impacts on aquatic habitats around the world. The waterfern weevil, *Stenopelmus rufinasus* Gyllenhal (Coleoptera: *Erirhinidae*), unintentionally introduced in Portugal, has shown promise as a biocontrol agent against *A. filiculoides*. While *S. rufinasus* is successfully used in some countries against *A. filiculoides*, no control plan exists in Portugal, and data about the weevils' distribution in Portugal is scarce. To create prospects for a biocontrol program against *A. filiculoides* in Portugal, a country-wide survey to update *S. rufinasus* distribution, and laboratory trials to reassess the weevil's feeding preferences were conducted. To this end, several *S. rufinasus* populations throughout the distribution of *A. filiculoides* were sampled. The weevil's feeding preferences were tested through plant species density effect and no-choice tests, focusing on *A. filiculoides*, *Lemna minor* L., and *Lemna minuta* Kunth. Our work updates and expands the known distribution of the weevil, extending it from Golegã and Vila Nova de Milfontes further north and into inland Portugal. As an early result, *S. rufinasus* showed a clear preference for *A. filiculoides*, with only sporadic feeding observed on *L. minuta*, an alien species in Portugal. While preliminary, this work shows encouraging results for implementing a biocontrol program against an invasive plant species in Portugal.

Connecting infrastructures and ecology to create landscape heterogeneity in grazed pastures

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Overgrazing reduces landscape heterogeneity in semi-natural areas. In agricultural landscapes crossed by high-voltage power lines, using their bases to rewild the vegetation can provide an opportunity to promote landscape heterogeneity because they are widespread and usually unmanaged, with negligible production for livestock. We applied two restoration solutions (passive and active) on very high-voltage pylon bases and assessed the effects on the taxonomic and functional diversity and structure of the plant community.

The study took place in southern Portugal under 15 power line pylons (plots of 48m²) distributed in semi-natural areas grazed by cattle. The plots were intervened in autumn 2017: 5 used as control (No Intervention), 5 fenced to exclude cattle grazing and promote natural regeneration (Passive Restoration), and 5 fenced and sown with a native seed mix (Active Restoration). Before (spring 2017) and after the intervention (spring 2018-2021), we assessed plant abundance through surveys and evaluated the community's taxonomic and functional diversity and structure.

Plant community structure and functionality changed, particularly in the active restoration plots, in 4 functional traits: height, seed mass, root depth, and specific leaf area. Both solutions increase landscape heterogeneity by providing vegetation patches with different specific compositions, community structures, and functionality, which may serve as stepping stones between patches of natural vegetation.

Coastal habitats around Santo Antão and their key habitat-forming species

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Cape Verde is an archipelago off the northwest coast of Africa with a long tradition of using marine resources. However, knowledge of marine habitats is largely limited to fishing communities, who could greatly benefit from a better knowledge of the oceans to enhance their management and conservation efforts. The archipelago is also unique as both temperate and subtropical species coexist, which could serve as a climate early warning system. Santo Antão is the second-largest island in the archipelago, in its northwesternmost position and one of the least known islands concerning its marine biodiversity and habitats. Our goal was therefore to identify and characterize the subtidal benthic habitats along the shallow coast of the Santo Antão and assess their potential vulnerability to climate and other stressors. Dropcam video sampling was employed as a cost-effective method to survey approximately 2/3 of the island, covering 232 sites. All benthic habitats were identified and classified according to the geographically relevant literature. Their habitat and habitat-forming species coverage were assessed using the SACFOR scale. A total of 286 habitats were recorded, representing 19 distinct marine habitats classified. Among these, seaweed-dominated habitats such as Maërl and Dyciotaceae communities were the most abundant. A preliminary assessment of the vulnerability of the habitats showed that most of them could be at risk of decline with future climate change.

ALISU: o Biobanco de Microalgas Marinhas da Universidade de Lisboa

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O Biobanco de MicroAlgas da Universidade de Lisboa (ALISU), fundado em 1997, é uma coleção de espécies de microfítoplâncton e microfítobentos ($\geq 20 \mu\text{m}$) provenientes de estuários, zonas costeiras e oceânicas de Portugal Continental, Açores e Madeira. O seu objetivo é a conservação *ex situ* da biodiversidade, com ênfase em espécies ecologicamente relevantes, produtoras de compostos ativos com impacto na saúde pública ou de interesse biotecnológico e espécies relevantes para a aquacultura.

Os grupos taxonómicos representados na coleção são, por ordem decrescente de diversidade, dinoflagelados, diatomáceas, haptófitas, clorófitas, eustigmatofíceas e rafidofíceas. Cada espécie está representada por mais de uma estirpe, da mesma região ou de diferentes regiões. A maioria está identificada com base na morfologia externa, pigmentos fotossintéticos, e sequenciação de rADN (LSU e ITS).

A coleção é amplamente utilizada em investigação e ensino na Universidade de Lisboa e noutras instituições, tanto nacionais como internacionais. O financiamento ao longo dos anos tem sido assegurado por diversos projetos científicos financiados pela FCT, em particular através do MARE e ARNET (UIDB/04292/2020, UIDP/04292/2020, LA/P/0069/2020). Atualmente a ALISU é parceira no projeto “Pacto da Bioeconomia azul” (C644915664-00000026), WP5 Algae Vertical, sendo responsável pela bioprospeção de novas estirpes de microalgas, o que tem permitido aumentar o número de isolados e a diversidade da coleção.

Ecological aspects on the terpene synthases in Menthinae, Lamiaceae: convergent and divergent evolution

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Plant ecology involves plant development and their interactions with biotic and abiotic elements. Primary metabolites synthesized by plants are crucial for vital processes, e.g. photosynthesis, and thus are highly conserved. On the other hand, interactions of plants with other organisms are unpredictable and rely on a diverse array of specialized metabolites, especially terpenoids. Some of their functions include herbivory deterrence and attraction of pollinators and parasitoids. The terpene synthases are therefore subject of selection. They are promiscuous, meaning they can use different ligands as substrates, and plastic, in a way that they produce a diverse array of terpenoids from a single substrate. Humans have long used terpenoids as part of daily lives for adding flavour to food and using as perfumes and pigments. Notably, terpenoids are also powerful medical agents as antioxidants, fighting cancer, antibiotics and antidiabetics. An important group of plants regarding terpenoids is the subtribe Menthinae, Lamiaceae. Here, we aimed to investigate positively selected sites in terpene synthases of this taxon and their possible ecological role. We found evidence of divergent evolution between the *Mentha* genus and the *Micromeria* group regarding monoterpene synthase ligand preference, but convergent evolution and switch of ligand preference within the latter, highlighting the relevance of this enzyme family in ecological adaptation.

Trees4Water - custo-efectividade de cenários de floresta ripária para a melhoria da qualidade da água

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As florestas ripárias são frequentemente associadas a vários benefícios, incluindo a redução da poluição difusa. Apesar de vários estudos avaliarem as vantagens dos cenários de floresta ripária na qualidade da água do rio, a análise de custo-efectividade dessas opções está ainda pouco abordada. Este estudo pretende avaliar o custo-efectivo de cenários de floresta ripária (faixas de proteção de 2,5m e 5m em troços de sub-bacias prioritárias) na redução de sedimentos, nitratos e fósforo, utilizando os resultados do modelo hidrológico SWAT, para um possível esquema de incentivo de 10 anos. O modelo SWAT foi calibrado e validado para caudal, sedimentos, nitratos e fósforo na bacia do rio Cávado, mostrando uma boa concordância com os valores observados. Os custos associados à implementação de faixas de proteção de florestas ripárias e os custos de oportunidade para os agricultores foram recolhidos no Instituto Nacional de Estatística (INE). Os resultados indicam que a opção de faixas de proteção de floresta ripária de 5m é a mais custo-efetiva para mitigar a poluição por sedimentos em comparação com outros contaminantes (3.34€/kg de sedimento abatido, 3 072€ por kg de fósforo e 445€ por kg de nitrato). Os cálculos detalhados dos custos de oportunidade oferecem diferentes perspetivas sobre as implicações económicas da conversão de terra em florestas ripárias (57ha de faixas ripárias: 700 000€ só com plantação e manutenção; cerca de 3 milhões incluindo os custos de oportunidade).

Fungal diversity modulates the effect of multiple stressors on leaf litter decomposition in streams

Graça, D. (1,2), Fernandes, I. (1,2), Silva, E. (1,2), Cunha, D. (1,2), Cássio, F. (1,2), Pascoal, C. (1,2)

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Human activities are responsible for abrupt changes in the planet. Global change-related alterations are expected to occur simultaneously and to affect the interconnected biotic and abiotic relationships. Plant-litter decomposition is a key process in freshwaters supported by microbial decomposers, mainly aquatic fungi, that ensure nutrient cycling and energy flow to higher trophic levels, upholding aquatic food webs. Knowledge on the effects of global change-related multiple stressors on litter decomposition is scarce; therefore, clarifying their impact on this process in freshwaters is of utmost importance. The present study investigated the impacts of multiple stressors related to global change (increasing temperature, nutrients, drying events, and fungal diversity loss) on leaf litter decomposition in microcosms using natural fungal communities with different diversity background. Results revealed that fungal richness and decomposition increased under stress, except for drying events. Fungal reproduction increased under abiotic stress, while fungal biomass accrual increased with drying and decreased with temperature. Finally, we found that fungal diversity modulated the impacts of all stressors (indirect effect) on litter decomposition by enhancing their effect. These findings highlight the importance of maintaining high biodiversity levels, as higher fungal taxon richness may strengthen the river capability to respond to multiple stressors related to global change.

CAPÍTULO 10

PREMIADOS

Prémios de Doutoramento em
Ecologia 2024 Fundação Amadeu Dias





PRÉMIO DE DOUTORAMENTO EM ECOLOGIA 2024



MARTINA PANISI

**CARACÓIS, FLORESTA E
PESSOAS: ECOLOGIA E
CONSERVAÇÃO DE
MOLUSCOS TERRESTRES
NAS ILHAS OCEÂNICAS
DO GOLFO DA GUINÉ,
ÁFRICA CENTRAL**

MAIS INFORMAÇÕES EM WWW.SPECO.PT

FOTOGRAFIA: (C) VASCO PISSARRA - FOREST GIANTS PROJECT



Investigadora no BIOPOLIS/CIBIO (Centro de Investigação em Biodiversidade e Recursos Genéticos) da Faculdade de Ciências da Universidade do Porto mas antes estudante de mestrado e doutoramento no cE3c (Centro de Ecologia, Evolução e Alterações Ambientais) da Faculdade de Ciências da Universidade de Lisboa, foi a vencedora do primeiro prémio do Prémio de Doutoramento em Ecologia - Fundação Amadeu Dias, organizado pela SPECO.

Martina Panisi desenvolveu um estudo multidisciplinar com vista a explorar as relações entre moluscos terrestres, os seus habitats e as pessoas que vivem nas ilhas oceânicas do Golfo da Guiné - São Tomé e Príncipe e Annobón. O seu grande desafio foi o de tentar desenvolver medidas de conservação eficazes em países em desenvolvimento que são ao mesmo tempo hotspots de biodiversidade. Nesta região, em particular, existe uma elevada proporção de endemismos de moluscos terrestres cuja ecologia e importância social é pouco conhecida. Por outro lado desconheciam-se as consequências das actividades humanas, como as alterações do uso do solo e a introdução de espécies exóticas na malacofauna destas ilhas ([mais informação aqui](#)).



PRÉMIO DE DOUTORAMENTO EM ECOLOGIA 2024

**ANA PAULA
PORTELA**



FOTOGRAFIA: HELENA HESPANHOL

**INTERLIGAR
BIODIVERSIDADE,
SERVIÇOS DE
ECOSSISTEMA E
ESTABILIDADE
ECOLÓGICA PARA A
SUSTENTABILIDADE DOS
ECOSSISTEMAS FLUVIAIS.**

MAIS INFORMAÇÕES EM WWW.SPECO.PT



Investigadora e antes doutoranda no BIOPOLIS/CIBIO (Centro de Investigação em Biodiversidade e Recursos Genéticos) da Faculdade de Ciências da Universidade do Porto, foi a vencedora do segundo prémio do Prémio de Doutoramento em Ecologia - Fundação Amadeu Dias, organizado pela SPECO.

Ana Paula Portela desenvolveu um trabalho em que interliga a biodiversidade, serviços de ecossistema e estabilidade ecológica com a sustentabilidade dos ecossistemas fluviais. Esta tese demonstra que os ecossistemas e as comunidades vegetais ripícolas, assim como os serviços de ecossistema que fornecem, são vulneráveis ao crescente stress ambiental a longo prazo e a eventos de seca extremos. A alta sensibilidade, a limitada capacidade adaptativa e resiliência, e a diminuição da diversidade funcional provoca o declínio da estabilidade ecológica destes ecossistemas ripícolas. Nestas condições, o bem-estar humano será negativamente afectado pelo declínio do fornecimento de serviços de regulação, o qual poderá também comprometer soluções baseadas na natureza para mitigação e adaptação às alterações climáticas ([mais informação aqui](#)).



PRÉMIO DE DOUTORAMENTO EM ECOLOGIA 2024



FOTOGRAFIA: JOANA PEREIRA

JOANA PEREIRA

**INTERAÇÕES HUMANOS-
FAUNA BRAVIA E
VULNERABILIDADE DOS
MEIOS DE SUBSISTÊNCIA
NO CONTEXTO DE
CONSERVAÇÃO EM
MOÇAMBIQUE.**

MAIS INFORMAÇÕES EM WWW.SPECO.PT



investigadora e antes doutoranda no [cE3c](#) (Centro de Ecologia, Evolução e Alterações Ambientais) da Faculdade de Ciências da Universidade de Lisboa, foi a vencedora do terceiro prémio do Prémio de Doutoramento em Ecologia - Fundação Amadeu Dias, organizado pela SPECO.

Joana Pereira desenvolveu um trabalho que demonstra a necessidade de uma visão holística do conceito de vulnerabilidade das comunidades e da sua integração na gestão de áreas protegidas em Moçambique, tendo em vista o objetivo de um modelo de conservação mais socialmente inclusivo. Esta tese demonstra que os problemas sociais e de conservação não podem ser endereçados separadamente, sendo muitas vezes interdependentes ([mais informação aqui](#)).

CAPÍTULO 11

LISTA DE PARTICIPANTES



| NOME | AFILIAÇÃO |
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| Afonso Petronilho | UC-Universidade de Coimbra, Coimbra, Portugal |
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| Bruno Adorno | CE3C |
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