



The 4th Israeli Conference for Conservation Science - the Hebrew University of Jerusalem, October 2024

The 4th Israeli Conference for Conservation Science

From inspiration to implementation



The Alexander Silberman Institute of Life Science, the Hebrew University of Jerusalem

27th-28th of October 2024

Program and abstract booklet



מרכז האוניברסיטה העברית לקיימות
The Hebrew University Center for Sustainability
مركز الجامعة العبرية للاستدامة



קרן קיימת לישראל
KKL - JNF



Society for Conservation Biology



Minerva Center for the study of
Population Fragmentation



האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM
الجامعة العبرية في القدس



Sunday Oct. 27th, 2024			
09:00	Coffee and registration		
09:30	Opening remarks (Rothberg Hall)		
	Yossi Paltiel, Dean of the Faculty of Sciences, the Hebrew University of Jerusalem		
	Guy Bloch, Head of the Alexander Silberman Institute of Life Science, the Hebrew University of Jerusalem		
	Uri Roll, President of the Israeli Chapter of the Society for Conservation Biology		
	Gilad Ostrovsky, Chief Forester, JNF-KKL		
	Erella Hovers, Co-director of the Minerva Center for the Study of Population Fragmentation		
	Oren Osterseizer-Biran, Director of the Hebrew University Center for Sustainability		
	Oren Kolodny, 4th Israeli Conference on Conservation Science Organizing Committee		
10:00	Panel discussion: Present and future effects of the war on conservation (Rothberg Hall)		
	Moderator: Jonathan Belmaker, Tel Aviv University		
	Yehoshua Shkedy, Israel Nature and Parks Authority		
	Tamar Raviv, Ministry of Environmental Protection		
	Maoz Fine, The Hebrew University of Jerusalem		
	Gilad Ostrovsky, KKL-JNF		
	Rona Winter-Livneh, Open Landscape Institute (DESHE)		
11:00	Coffee break		
11:30	Rothberg Hall		Kaplan Hall
	Session A: Habitat restoration and conservation (Chair: Shani Gleitman)		Session B: Biodiversity and conservation in human-dominated landscapes (Chair: Avi Perevolotsky)
11:30	Shani Gleitman	Restoring rare plant habitats in Israel: An ecological model for hot-spot forest management in the Ilanot-Kadima forests	Yuval Itescu
11:45	Karmit Levy	Comparing impacts of two restoration approaches on wild bee assemblages and their habitat resources in an early successional sandy Mediterranean ecosystem	Tamir Klein
12:00	Guy Rotem	Ecological restoration of mining sites: After seven years of research, what have we learned?	Orr Comay
12:15	Inbal Biberman	Transforming KKL-JNF's approach to nature conservation: Surveying protected natural values prior to forest management	Arielle Lofchick*
12:30	Anat Tsafirir	European nightjar population survey in northern Negev forests - spring and summer 2022	Adam Lampert
12:45	Ori Hepner Ucko*	Surprising widespread <i>Cymodocea nodosa</i> occurrence along Israel's Mediterranean coast and implications for seagrass conservation in a hotspot of climate change	Liron Shani
13:15	Lunch and poster session[^]		



14:30	Keynote address: Ron Milo, Weizmann Institute of Science (Rothberg Hall)			
	The biomass distribution on Earth and humanity's impact			
15:30	Coffee break			
	Rothberg Hall		Kaplan Hall	
	Session C: Species rehabilitation, relocations and reintroductions (Chair: Noam Leader)		Session D: Effects of habitat fragmentation on biodiversity and endangered species (Chair: Keren Klass)	
16:00	Ori Fragman-Sapir	Endangered plant species - propagation and re-introduction challenges	Keren Klass	Effects of forest fragmentation on endangered black howler monkeys: Insights from molecular data
16:15	Nili Anglister	Extreme temperatures impede the release success of captive-bred avian scavengers	Ron Chen	Pervasive edge effects of human settlements and plantations as revealed in Israel's State of Nature Report 2023
16:30	Noa Lavie*	Conservation implications of dietary considerations in the critically endangered Acacia gazelle (<i>Gazella arabica acacia</i>)	Ohad Peled*	A network-based approach for mitigating the genetic outcomes of fragmentation
16:45	Shir Sassoon*	Comparative analysis of movement patterns in nesting and rehabilitated sea turtles using satellite tracking data	Shlomo Preiss-Bloom*	Predators, land use and culling interactions shape community trophic dynamics
17:00	Gideon Vaadia*	Tracking Griffon Vultures' use of feeding station to improve conservation practices	Adi Barocas	Impacts of artisanal gold mining on giant otter populations and neotropical freshwater ecosystems
17:15	Mai Lazarus*	Designated juvenile surveys identify cobble beds as important nursery habitats for coral reef fishes	Yehuda Samuel*	Movement patterns of the golden jackal (<i>Canis aureus</i>) in the Harod and HaMaayanot valleys for improving rabies management interface
18:00-20:00	Social event			



Monday Oct. 28th, 2024				
9:00	Coffee and registration			
9:30	Keynote address: Tamar Zandberg, Ben-Gurion University of the Negev (Rothberg Hall)			
	From science to policy: The role of nature conservation in sustainable environmental policy			
10:30	Coffee break			
	Rothberg Hall		Kaplan Hall	
	Session E: Genetics in conservation (Chair: Tali Magory Cohen)		Session F: Big data and broad patterns in conservation (Chair: Alon Rothschild)	
10:45	Tali Magory Cohen	Evolutionary consequences of mercury pollution on avian bioindicators in the Western Amazon	Alon Rothschild	Risk analysis from marine infrastructures to birds in Israel
11:00	Dvora Low Ramati	Lost genetic heritage: the wild olive trees of the Atlit Kurkar ridge	Yaron Ziv	A new international nature conservation index to assess countries' conservation performance
11:15	Noa Y. Kan Lingwood*	Factors affecting female wild ass (<i>Equus hemionus</i>) social associations following a change in water-source distribution	Aviad Scheinin	Twenty-five years of Israeli coastal dolphins' population conservation research from inspiration to implementation.
11:30	Tom Morav*	Deep connections: Exploring the genetic connectivity of mesophotic and shallow-water populations of the sponges <i>Axinella polypoides</i> and <i>Ircinia variabilis</i>	Lior Greenspoon*	The global biomass of mammals since 1850
11:45	Sviatoslav Rybnikov	Gene drives in combating biological invasions: Minimizing the spillover risk by pesticide application	Ateret Shabtay	Benthic habitats representativeness in marine protected areas in the territorial waters - existing state and recommendations for the update of the Maritime Policy and Vision document
12:00	Uri Wolkowski	Taxonomic and ecological characterisation of the Bupal hartebeest (<i>Alcelaphus buselaphus buselaphus</i>) of northern Africa & the Levant	Shai Scharfberg	Ancient agriculture systems in the Negev - mapping, locating and developing tools for preservation and restoration, to promote heritage, cultural and ecological values
12:30	Lunch and poster session[^]			



13:45	<p>Panel discussion: Reclaiming anthropogenically degraded landscapes for nature conservation (Rothberg Hall)</p> <p>Moderator: <i>Noam Ben-Moshe, Tel Aviv University</i></p> <p>Dotan Rotem, Israel Nature and Parks Authority Anat Tsafir, KKL-JNF Gili Tessler, Israel Land Authority Dror denneboom, Society for the Protection of Nature in Israel Ron Chen, HaMaarag - Israel National Ecosystem Assessment</p>			
14:45	Coffee break			
	Rothberg Hall		Kaplan Hall	
	Session G: Applying insights from animal behavior in conservation (Chair: Yoav Perlman)		Session H: Applications of unorthodox tools in conservation (Chair: Tal Polak)	
15:15	Yoav Perlman	Southbound migration timing and routes of GPS tagged European turtle-doves from Israel	Tal Polak	Using machine learning to establish new monitoring method for wild population of Arabian oryx (<i>Oryx leucoryx</i>)
15:30	Sefi Horesh*	Integrating empirical and theoretical approaches to investigate the endemic and critically endangered Be'er Sheva fringe-fingered lizard	Victor Rina (China)*	Leveraging large language models for social media image analysis in conservation sociology
15:45	Klil Shahar*	High-resolution tracking of the invasive common myna (<i>Acridotheres tristis</i>) in the Negev Highlands	Re'em Neri*	Utilizing social media to monitor the endangered Spinetail Devil Ray (<i>Mobula mobular</i>) fishery in the Gaza Strip, southeastern Mediterranean
16:00	Yuval Zukerman*	Variation in tolerance behavior of the threatened Nubian ibex inside human settlements is shaped by people's behavior	Yuval Mendelson*	Using "junk" acoustic data for monitoring the state of coral reefs
16:15	Orr Spiegel	Ageing in nature: Examining lifelong changes in movement and social behavior of Griffon vultures (<i>Gyps fulvus</i>)	Noam Leader	Poaching of a priceless gazelle does not pay - demand for ecological restitution through civil lawsuits as a deterrent to illegal hunting
16:30	Amir Arnon	Cascading effects of anthropogenic food on golden jackals (<i>Canis aureus</i>) and mountain gazelles (<i>Gazella gazella</i>) in a peri-urban environment	Leigh Livne	Inspiration to implementation: Advancing conservation through catch-and-release shark programme - Israel's in-situ lab
17:00	Closing remarks and awards			
17:30-19:00	Social event: Beers and snacks on the lawn			

^ See below for details on poster sessions

*Candidates for student prizes



Poster session Sunday Oct. 27th, 2024		
No.	Presenter	Poster title
1	Adi Barash	The MECO project (Mediterranean Elasmobranch Citizen Observations): Using social media to create a regional database of elasmobranch observations
3	Dan Bez Golanski*	Is it hot? Tracking parrotfish behavior during eight marine heatwaves in the Red Sea
5	Doron Ashkenazi*	Seaweeds of the Israeli seas: Exploring ecological and biotechnological potential through species diversity and seasonality
7	Eleanor Diamant	The importance of biome in shaping urban biodiversity
9	Franklin Sargunraj*	Conservation genetic strategies for the Hula painted frogs (<i>Latonia nigriventer</i>) by assessing habitat preference
11	Jessica Schäckermann	Wildflower-strips to conserve biodiversity in desert agriculture
13	Noy Kaminer Bitton*	Effects of microplastic on a native coastal plant
15	Roe Ben Nissan*	Sea level rise implications on land vertebrates' distributions
17	Rotem Mor*	Trophic ecology of the invasive marbled crayfish in Israel
19	Sharon Moscovitz*	Food fight: Monosex prawns and crayfish as biocontrol agents against pest freshwater snails
21	Tamar Birman	Anthropogenic effects on charismatic species' distributions - the case of orchids in Israel
23	Yafit Brenner	Integrating philosophy of science and conservation biology in schools as part of a large ecological restoration project
25	Yuval Rosenberg	Biomass movement metric as an educational tool for the Anthropocene

***Candidates for student prizes**



Poster session Monday Oct. 28th, 2024		
No.	Presenter	Poster title
2	Dan Amichai*	Small and fragmented sites may be preferable for species' reintroduction: using a pop-gen perspective to inform reintroduction strategies
4	Daniel Idan*	Open woodland: Detrimental or beneficial?
6	Eduardo Arlé	Non-stationarity in the impact of climate across mammal species ranges
8	Enav Vidan	Prioritizing conservation actions with climate change - the case of Israeli reptiles
10	Liran Sagi*	Burrow deep: How nest site selection protects desert chameleons from climate extremes
12	Nicolas Dubos*	Mapping method and data source matters in conservation
14	Ori Shapira*	The effect of designated pastoral lands on mammals' diversity at Mediterranean habitats
16	Rona Winter-Livneh	Ecological evaluation of agricultural landscape within the Tkuma region, following the Gaza war
18	Shahar Dubiner	Eco-op: An information sharing network to promote cooperation between environmental organizations and ecologists in academia
20	Tal Schabes	Impacts of invasive species control on plant functional traits and resource use in endemic <i>Scalesia</i> forests of the Galápagos
22	Yonat Gefen*	Drivers of introduction rate in marine alien species across taxa

**Candidates for student prizes*



Oral presentation abstracts

Session A: Habitat restoration and conservation

Restoring rare plant habitats in Israel: an ecological model for hot-spot forest management in the Ilanot-Kadima forests

Shani Gleitman

Ecology department, KKL-JNF

Among the hundreds of rare plant species in Israel, two significant groups are typical of habitats found in deep soils: heavy soils in valleys and highlands, and sandy soils along the coastal plain. The natural habitats on fertile heavy soils have largely disappeared due to intensive modern agriculture, while those on sandy soils have been lost due to rapid coastal development. However, these habitats are still represented in KKL-JNF forests, which host dozens of rare plant species. In 2023, KKL-JNF completed a long-term management plan for the Ilanot-Kadima forests, one of the last and most important habitats on the Hamra soils of the coastal plain. The plan aims to restore and enhance habitat conditions to optimally support populations of endemic and rare plant species in the forest. It outlines the actions needed to preserve and improve these ecological values while gradually restoring the native oak forest that once existed in this area. Implementation of the plan began immediately after its completion and will be carried out gradually over the next decade. This plan is the first of its kind by KKL-JNF and serves as a model for developing similar plans for other ecologically unique forests.



Comparing impacts of two restoration approaches on wild bee assemblages and their habitat resources in an early successional sandy mediterranean ecosystem

Karmit Levy⁵, Aviv Avisar^{1,2}, Tamar Dayan^{1,2}, James Aronson^{3,5}, Yael Mandelik⁵

1. School of Zoology, Faculty of Life Science, Tel Aviv University, Tel Aviv, Israel. 2. The Steinhardt Museum of Natural History, Tel Aviv University, Tel Aviv, Israel 3. Ecological Health Network, Cambridge, MA, U.S.A. 4. Center for Conservation and Sustainable Development, Missouri Botanical Garden, St. Louis, MO, U.S.A. 5. Department of Entomology, Institute of Environmental Sciences, The Robert H. Smith Faculty of Agriculture, Food and Environment, The Hebrew University of Jerusalem, Rehovot, Israel

Wild bees, crucial pollinators for wild and crop plants, are declining globally. Habitat restoration, a key conservation strategy, encompasses a range of approaches including assisted spontaneous regeneration ('passive restoration') and 'active restoration'. We conducted a five-year study of bee assemblages and their habitat resources in a Mediterranean coastal dune ecosystem, where planted Eucalyptus stands were clear-cut and managed. The study involved five blocks of four habitat types: native shrublands, intact Eucalyptus stands, and regenerated and restored habitats. Regenerated habitats resembled natural habitats in nesting and floral resources. Flower abundance and species composition displayed similar successional patterns in both managed habitats. Bee abundance was initially lowest in both managed habitats, but by the fifth year, restored habitats had the highest bee abundance. In the final year, taxonomic and functional bee species composition differed between the managed and natural habitats. Both approaches increased the availability and diversity of nesting and foraging resources, and wild bee abundance, compared to Eucalyptus habitat. However, the differences in various bee assemblage characteristics between the managed and natural habitats demonstrate an ongoing successional process with potential functional consequences. Regeneration and restoration are complementary strategies for enhancing wild bee habitats, supporting their combined application in Mediterranean dune ecosystems.



Ecological restoration of mining sites: after seven years of research, what have we learned?

Guy Rotem, Yaron Ziv

Department of Life Sciences, Ben-Gurion University of the Negev, Israel

For over 60 years, phosphate strip mining in the Oron-Ziv region of the Negev Desert has severely impacted the hyper-arid ecosystem, fragmenting its landscape and harming biodiversity. In the last 15 years, a reclamation-focused mining method has been adopted, where topsoil and overburden are stockpiled separately and replaced in reverse order to preserve the landscape. We assessed the ecological outcomes of this approach by comparing natural (reference) and restored sites, focusing on soil, microorganisms, plants, and arthropods. Results showed significant differences between the sites, particularly in microbial communities. Photosynthetic groups, like cyanobacteria, were less prevalent in restored areas, hindering the development of stabilizing soil biocrusts. Plant germination in restored sites was also impacted due to the absence of a seed bank, likely caused by loose soil conditions. Additionally, restored sites were dominated by generalist arthropods, while natural sites hosted more specialist species. Our findings highlight the importance of geomorphological stability and biophysical diversity, driven largely by the role of soil biocrusts in supporting ecosystem recovery. Future work will focus on increasing habitat diversity and enhancing native biodiversity.



Transforming KKL-JNF's approach to nature conservation: surveying protected natural values prior to forest management

Inbal Biberman¹, Dvora Low Ramati¹, Gaya Sherf¹, Ahikam Gera¹, Omri Shalev², Dar Ben-Nathan¹, Amir Perelberg¹, Dotan Rotem³, Shani Gleitman², Yahel Porat²

1. Open Landscape Institute (OLI), National Center for Biodiversity Research, Steinhardt Museum of Natural History, Tel Aviv University; 2. Ecology Department, Forestry Division, KKL-JNF; 3. Israel Nature and Parks Authority

Forest thinning and reforestation of degraded stands are the most significant tools used for forest management. These practices are essential for improving forest health, increasing biodiversity, and achieving different forest land-use designations. However, implementing the management practices might also risk natural assets that exist in the area. In order to minimize this risk and protect natural assets while enabling the essential forest management to continue, a method for survey and mapping these natural values was developed. Over the last five years, ~86,000 dunams were surveyed. The survey's findings indicated that KKL-JNF forests host many unique natural values, about which very little was known prior to this project: 3,096 records were documented, including 150 endangered plant species (1,042 records), new plant species for Israel, and vital populations of endangered species. Some of the records expanded the previously known distribution of rare species. Forests were found to be 'hotspots' or refuge for many endangered species, primarily in threatened habitats such as wetlands and alluvial clayey soils. The method is now a standard practice in KKL-JNF annual working plan, and forest management is carried out according to the findings and professional guidelines devised in this project, ensuring compliance with regulations for preserving protected natural values.



European nightjar population survey in northern negev forests - spring and summer 2022

Anat Tsafir, Menachem Adar, Yahal Porat

KKL-JNF

During the 1960s there was the last report of a nesting population of European nightjar in Israel until another population was found in 2017, and in 2021, nightjars were observed in Gevar'am Forest. This report was followed by a survey in the northern Negev forests. The survey objectives were to locate the nightjars' territories and characterize their habitat. The nightjar identification occurred through night-time walking, using recordings of nightjar calls and following their responses. Territories were found only in Gevar'am Forest and in Yad Mordechai Forest. A common feature of the territories is tree cover with varying densities, along with understory of shrubs and herbs. Although the findings do not clarify how nightjars utilize the area, the nightjar exploits the quiet and dark parts of Gvar'am forest. This discovery is significant, as this is the second nesting population of the nightjar found in the in Israel since the 1960's. The findings of the survey assist in developing appropriate management to conserve the nightjar population in the forests. Restrictions regarding the working season in the forest and finding suitable places for tourism development. The findings exemplify the rich biodiversity found in JNF forests, highlighting their importance to natural open spaces in Israel.



Surprising widespread *Cymodocea nodosa* occurrence along Israel's Mediterranean coast and implications for seagrass conservation in a hot spot of climate change

Ori Hepner Ucko⁵, Eduardo Arlé¹, Shahar Malamud^{1,2}, Gidon Winters^{3,4}, Jonathan Belmaker^{1,2}

1. School of Zoology, George S. Wise Faculty of Life Sciences, Tel Aviv University, Tel Aviv, Israel; 2. The Steinhardt Museum of Natural History, Tel Aviv University, Tel Aviv, Israel; 3. The Dead Sea-Arava Science Center, Masada, Israel; 4. Department of Life Sciences, Ben-Gurion University of the Negev, Eilat, Israel; 5. Nature and Parks Authority, Jerusalem 95463, Israel

Cymodocea nodosa is a temperate seagrass species that grows in the shallow and sheltered waters of the Mediterranean Sea. Despite being widespread, it was assumed to be absent along the Israeli warm and salty coastline. We conducted methodical underwater surveys along the Israeli Mediterranean coast, incorporating depth, latitude, season, and habitat features, and revealed extensive *C. nodosa* population at depths of 8-21m (peak occurrence at 14m) in exposed habitats. Using general additive models, we illustrated how depth, latitude, and season influence local meadow distribution. We conduct a systematic literature review to compare the habitat affinity of the Israeli meadows with other populations in the eastern Mediterranean Sea. By incorporating species distribution models, we confirmed the increase in the geographical range also reflects an increase in realized niche breadth into higher values of temperatures, salinity and current velocity. Considering that the eastern tip of the Mediterranean is a hotspot for climate change, finding *C. nodosa* populations surviving these harsh conditions holds implications for seagrass conservation and restoration in the entire Mediterranean. However, the low density of observed meadows suggests that these populations require careful monitoring to prevent local extirpation.



Session B: Biodiversity and conservation in human-dominated landscapes

The dark side of conservation: cemeteries as sanctuaries for urban bats

Yuval Itescu⁴, Melissa Birkner¹, Christian Voigt^{1,2}, Jonathan Jeschke^{1,3}

1. Institute of Biology, Freie Universität Berlin, Berlin, Germany; 2. Leibniz Institute for Zoo and Wildlife Research (IZW), Berlin, Germany; 3. Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB), Berlin, Germany; 4. Department of Evolutionary and Environmental Biology, University of Haifa

Urbanization threatens bats, but many species adapt to city environments. In Europe, urban cemeteries offer dark, quiet green spaces that can benefit bats, though their role as suitable habitats is understudied. This study examines the conservation potential of cemeteries and the environmental factors influencing bat presence and activity. We conducted acoustic surveys in 17 Berlin cemeteries, nine of which were near water bodies, using two recording devices per site. We also measured vegetation complexity, noise, light levels, and impervious surfaces. Using generalized linear mixed models, we tested the effects of these environmental factors on total bat activity, species richness, feeding behavior, and social calls. Water availability had a positive effect on all species, while vegetation features were crucial for different types of foragers. Increased light, noise, and impervious surfaces negatively impacted bat activity and species richness, except for *Pipistrellus pipistrellus*, which was associated with higher light levels. Our results indicate that dark, quiet cemeteries provide valuable urban habitats for bats, supporting urban biodiversity conservation. These findings offer important insights for city planning and management to enhance bat populations and their conservation in urban environments.



Hardcore science for hardcore conservation: climatic effects in the appeal against Lavan ridge development, Jerusalem

Tamir Klein

Weizmann Institute of Science

Urban sprawl around the city of Jerusalem is expected to cause deforestation of ~100 ha in Lavan ridge. As part of the Society for the Protection of Nature in Israel appeal against this plan, climatic effects were calculated. This involved contemporary research results from the Weizmann Tree Lab on tree carbon and water relations, measured directly in a nearby site. We showed that (1) The urban heat island would expand, due to the loss of forest-related evaporative cooling, by 1 C for a pine forest and 2 C for an oak maquis. (2) Climate effects would grow further due to the loss of CO² sequestration by trees. This includes 8,100 ton C stored in the trees, 25,000 ton C stored in the forest soil, and 67,500 ton C of lost C sequestration amounts before the year 2100. These effects join the additional adverse impacts on flora and fauna of the region. Although the appeal process has not yet concluded, this is the first time that climatic effects have been calculated for a development plan in Israel.



Impact of agriculture on desert arthropod biodiversity

Orr Comay^{1,2}, Adi Ramot², Gilad Ben Zvi², Ittai Renan^{1,2}

1. HaMaarag; 2. The Entomological Laboratory for Applied Ecology, The Steinhardt Museum of Natural History, Tel Aviv University

Agriculture is often deemed as a serviceable land use for ecological corridors in landscape planning. In the western Negev dunes, agriculture (mainly in greenhouses and net-covered plots) is the main anthropogenic land cover category. Since 2017, The Israeli National Biodiversity Monitoring Program conducts recurring entomological surveys in the western Negev dunes in fixed plots within agricultural habitats, as well as in natural habitats. Arthropod species richness, total arthropod abundance and the geometric mean abundance were significantly higher in agricultural plots compared to natural plots. Likewise, species composition was considerably different between agricultural and natural plots. For instance, aridity-adapted taxa such as *Erodium*, *Pimelia angulata*, *Tentyrina orbiculata* and *Discoptera arabica* are significantly more common in natural habitats, while Mediterranean taxa such as *Gonocephalum* and *Cataglyphis livida* occur almost exclusively in agricultural plots. Taken together, our results illustrate how desert agriculture dramatically impacts the natural biodiversity. Agricultural habitats in the desert are considerably different from the surrounding natural habitats due to increased availability of water, shade, nitrogen, organic matter and cover from predators and harsh weather. Therefore, agriculture can facilitate the introduction of non-desert taxa into arid habitats, and also support large populations of species who are naturally scarce in deserts.



The impact of artificial light at night on wild plants and pollination

Arielle Lofchick¹, Michal Gruntman^{2,3}, Yuval Sapir²

1. The Porter School of Environment and Earth Sciences The Faculty of Exact Sciences; 2. School of Plant Sciences and Food Security; 3. Department of Environmental Studies

As the global demand for artificial light continues to increase, understanding the impact of artificial light at night (ALAN) on ecosystems is crucial. This study explores the impact of ALAN on plant performance, examining variables such as biomass, stomatal conductance, nectar production, and insect visitation in two nocturnal blooming plant species. *Silene nocturna* and *Oenothera drummondii* were grown under controlled conditions, with plants placed in either a control group (natural light/dark cycle) or an experimental group exposed to constant light. Results showed that ALAN increased reproductive tissue biomass, fruit production, and stomatal conductance in *S. nocturna*. In *O. drummondii*, ALAN increased aboveground biomass and pod production without affecting stomatal conductance. ALAN decreased diurnal pollination but increased nocturnal pollination. ALAN lowered nectar volume and sugar concentration regardless of the time of day. These findings indicate that some nocturnal species may tolerate or even benefit from artificial light, using it as a resource to enhance reproduction. In contrast, others may experience disruptions in growth and pollination. This research highlights the complex, species-specific effects of artificial light on plant-pollinator interactions and highlights the importance of ongoing research to understand these dynamics to mitigate the ecological impacts of light pollution.



Optimal removal of host plants to slow the spread of invasive insects

Adam Lampert

The Hebrew University

Invasive species are spreading worldwide, causing damage to ecosystems, biodiversity, agriculture, and human health. A major question is how to cost-effectively allocate treatment efforts over space and time to stop or slow the species' spread. Here, we focus on the spread of the spongy moth (*Lymantria dispar*) in North America. We develop a spatially explicit mathematical model of the moth's population dynamics, and we examine how to cost-effectively combine three treatment methods: (1) removal of host plants on which the moth depends for nutrition, (2) mating disruption in which synthetic pheromones are distributed to destruct the males, and (3) insecticide application. Each method affects the moth population differently and can be applied in different locations across the landscape. We developed a novel computer algorithm that could find the optimal strategy that minimizes the overall cost. Our results show that, to stop the spread of the moth, it is more cost-effective to remove many host plants in a relatively narrow area rather than removing just a few host plants over a wide area. The other treatment methods should be applied between the area where the host plants are removed and the area that is kept free from the moths' presence.



Legal alien or invasive species? emotions, science, and controversies in sabra conservation

Liron Shani

The Department of Sociology and Anthropology at the Hebrew University

This lecture addresses the challenges of invasive species management amid globalization and climate change. Using ethnographic methods, including participant observations, in-depth interviews, and document analysis, it explores divergent strategies for controlling invasive species, particularly the case of protecting sabras from an invasive insect through the introduction of a 'natural enemy'. Two main perspectives emerge: 1) a 'solid boundaries' approach that emphasizes strict separation between native and invasive species, advocating caution in human interventions; and 2) a 'liquid borders' approach that distinguishes between harmful and beneficial species, highlighting the potential of science to manage risks and prevent extinctions. The study reveals differences in ecological and scientific assumptions and addresses the emotional and societal dimensions of invasive species debates. It calls for incorporating cultural and social considerations into ecological research and conservation strategies.



Session C: Species rehabilitation, relocations and reintroductions

Endangered plant species: propagation and re-introduction challenges

Ori Fragman-Sapir

National Natural History Collections, the Hebrew University of Jerusalem

Over 430 plant species are endangered in Israel, most of which are propagated and grown in the Jerusalem Botanical Gardens as well as in other botanical gardens, shelter gardens, and the Israel Gene Bank. Surprisingly, some of the rarest and most vulnerable species in nature are very easy to propagate and were even found to be weedy in nursery situations. In this talk we review success cases and challenges of these plant propagations. The second part of the talk will deal with the quality of the plants produced in nurseries and their chances to be re-introduced successfully in nature. Different show cases will be discussed.



Extreme temperatures impede the release success of captive-bred avian scavengers

Nili Anglister¹, Gideon Vaadia¹, Marta Acácio¹, Eitam Arnon¹, Michael Bruer¹, Ohad Hatzofe²,
Ygal Miller², Roni King², Noa Pinter-Wollman³, Orr Spiegel¹

1.School of Zoology, Faculty of Life Sciences, Tel Aviv University, Tel Aviv 69978, Israel; 2.Science Division, Israel Nature and Parks Authority, 3 Am Ve'Olam St. Jerusalem, 9546303, Israel; 3. Department of Ecology and Evolutionary Biology, University of California Los Angeles, Los Angeles, CA 90095, U.S.A.

Conservation translocations are central for managing endangered species, but their implementation faces logistical and financial challenges. Post-release mortality often leads to translocation failures, highlighting the need to identify and mitigate the relevant risk factors. The population of Griffon vultures (*Gyps fulvus*) in Israel is on the brink of extinction and we focused on supplemental releases of captive-bred or imported rehabilitated individuals by the local Nature Authority. To investigate Griffons' survival we used GPS tracking and thermometers, and compared the behavior, and weather conditions experienced by released birds with those of nearby wild-born Griffons. Results revealed a significantly lower survival rate at the Judean Desert release site. High temperatures preceding death suggested heat stress as the primary cause, and post-mortem examinations eliminated alternative factors. Compared to their wild counterparts, released individuals exhibited lower flight probabilities and shorter daily travel distances, arguably contributing to their failure to avoid harsh environmental conditions. These findings prompted adjustments to the release protocol, significantly improving early survival in the Judean Desert. Our study demonstrates the optimization of conservation practices, and how integrating ecological, clinical, and biotelemetry data can facilitate the survival of endangered species, particularly important in the context of climate change.



Conservation implications of dietary considerations in the critically endangered acacia gazelle (*Gazella arabica acacia*)

Noa Lavie¹, Yael Levinson¹, Jessica M. Rothman², Dror Hawlena¹

1. Department of Ecology, Evolution and Behavior, The Alexander Silberman Institute of Life Sciences, The Hebrew University of Jerusalem, Jerusalem, Israel; 2. Department of Anthropology, Hunter College of the City University of New York, New York, NY, USA

Animals consume different foods in specific quantities and ratios to meet a multi-dimensional nutrient target that maximizes their fitness. Consequently, understanding the nutritional ecology of a species is instrumental in developing efficient management plans for its conservation. We quantified the dietary considerations of a critically endangered population of Acacia gazelles (*Gazella arabica acacia*) in the southern Arava, Israel, and compared their diet and nutrition to that of sympatric Dorcas gazelles. We used behavioral observations, nutritional quantification, and measurements of food resources' chemical and physical traits to uncover this species-specific dietary and nutritional strategy. Acacia gazelles mainly consumed resources from two *Vachellia* (formerly *Acacia*) subspecies differing in their morphology, nutritional composition, and phenology. Gazelles maintained a narrow nutritional target, tightly regulated their protein intake, and prioritized non-structural carbohydrates. These were achieved by adjusting the consumption of leaves, pods, and flowers of *Vachellia* trees based on availability and nutritional demand. Despite major dietary differences from Dorcas gazelles, both gazelle species converged to a similar intake target. Our analysis revealed no evidence of a nutritional deficiency or intense resource competition between gazelle species, suggesting no immediate intervention is needed, though continued monitoring is required. We further recommend future reintroduction habitats based on their dietary strategy.



Comparative analysis of movement patterns in nesting and rehabilitated sea turtles using satellite tracking data

Shir Sassoon¹, Yaniv Levy^{1,2}, Dan Tchernov¹

1. Marine Biology Department, Leon H. Charney School of Marine Sciences, University of Haifa, Haifa 3498838, Israel; 2. Israel's Sea Turtle Rescue Center, Nature & Parks Authority, Beit Yanai National Park 4020000, Israel

Loggerhead and green sea turtles in the Mediterranean undertake resource-driven long-distance migrations between feeding and breeding habitats, making them highly vulnerable to anthropogenic threats. Given their endangered status, understanding sea turtles' habitat use, movement, and behavior is crucial for conservation efforts. Rehabilitating injured individuals is one vital approach, essential for the conservation of threatened populations. In this research, the readaptation of post-rehabilitated turtles to the wild was examined by quantifying behaviors and the spatiotemporal use of the eastern Mediterranean, deriving conservation recommendations. 98 sea turtles, rehabilitated and nesting, were tagged with satellite transmitters, resulting in 24,900 tracking days, covering a total distance of 316,515 km. Novel methodology, combining displacement plots, segmented regression models and mapping, was used to categorize routes into periods of residency and migration; The characteristics of each period type - home range or straightness index, speed, continental shelf use, submergence behavior, survival rates, and hotspot analysis - were assessed for each species, sex, life stage and injury, seasonally. The period classification method developed in this study is a valuable tool that demonstrated high effectiveness by revealing different migration magnitude in rehabilitated and nesting individuals and providing novel documentation of breeding behaviors in rehabilitated turtles.



Tracking Griffon vultures' use of feeding station to improve conservation practices

Gideon Vaadia¹, Marta Acacio¹, Nili Anglister¹, Ohad Haztofe², Orr Spiegel¹

1. Tel Aviv University, School of Zoology; 2. Israeli Nature and Parks Authority, Science Division

Human-induced changes are endangering many species. Vultures are particularly impacted by human activities. In Israel, Griffon vultures (*Gyps fulvus*) are critically endangered, primarily due to poisoning. The Israel Nature and Parks Authority manages this population using strategies like provisioning of food in Supplementary Feeding Stations (SFS), GPS-tracking a large proportion of the population, and sanitation. Detecting feeding events, crucial for understanding SFS effectiveness and reducing poisoning, is difficult due to the Griffons' wide-ranging areas. To analyze SFS use by Griffons, and its effectiveness as a conservation practice, we used GPS and accelerometer data from 54 tagged Griffons, we identified 111 feeding events across two seasons. We examined SFS use rates by individual Griffons and feeding-event age composition, Griffons fed mostly in SFS on an individual level (mean=85±15%), and most feeding events occurred within SFS (58%), suggesting the practice is effective at preventing non-SFS feedings, and thus poisoning events. We found that age and home-range structure influenced SFS use. Subadult vultures were over-represented in non-SFS feeding events, which pose a greater risk of poisoning. The study also highlights that younger age-groups frequent non-SFS events in addition to SFS, suggesting that food-provisioning should be adjusted to better fit this vulnerable age-group.



Designated juvenile surveys identify cobble beds as important nursery habitats for coral reef fishes

Mai Lazarus¹, Tal Gavriel¹, Jonathan Belmaker^{1,2}, Roi Holzman^{1,3}

1. School of Zoology, George S. Wise Faculty of Life Sciences, Tel Aviv University; 2. Steinhardt Museum of Natural History, Tel Aviv University 3. The Interuniversity Institute for Marine Sciences of Eilat

Habitat use by coral reef fish communities is still unresolved, as juveniles often use different habitats than their adult-phase habitats. Several habitats have been established as nurseries, mainly seagrass meadows and mangrove forests. Since nursery research is currently largely focused on these habitats, other, less charismatic habitats, such as cobble beds are overlooked, limiting our understanding of the mosaic of habitats necessary throughout ontogeny. Here, we use paired underwater visual census of designated juvenile surveys and across-life-stage surveys conducted along the Israeli coast of the Gulf of Aqaba, to unveil potential nursery habitats. We find that cobble beds support high juvenile densities and species richness compared to seagrass meadows. Moreover, several species are obligatory to cobble beds as juveniles. Finally, designated juvenile surveys in cobble beds reveal higher juvenile densities, smaller sizes, and distinct species compared to across-life-stage surveys, emphasizing that surveys which are not juvenile-designated may be non-inclusive. Taken together, our results demonstrate that cobble beds may serve as important nursery habitats for coral reef fish, and that designated juvenile surveys may be required to identify nursery habitats. At times when coastal development is increasing, protecting cobble beds habitats may be crucial to conserve coral reef fish communities.



Session D: Effects of habitat fragmentation on biodiversity and endangered species

Effects of forest fragmentation on endangered black howler monkeys: insights from molecular data

Keren Klass¹, Sarie Van Belle², Julie Teichroeb³, Eva Wikberg⁴, Gwen Duytschaever⁵, Hadjira Hamou⁵, Anthony Di Fiore², Katherine Amato⁶, Amanda Melin⁵, Gili Greenbaum¹

Department of Ecology, Evolution and Behavior, The Alexander Silberman Institute of Life Sciences, The Hebrew University of Jerusalem 2. The University of Texas Austin; 3. The University of Toronto Scarborough; 4. The University of Texas San Antonio; 5. The University of Calgary; 6. Northwestern University

Habitat loss and fragmentation are urgent threats to biodiversity, and molecular data are extremely informative regarding different effects of habitat fragmentation on wild populations. For endangered black howler monkeys (*Alouatta pigra*) inhabiting a landscape with increasing levels of fragmentation in Chiapas, Mexico, we used a dataset of 9567 SNPs to test the hypothesis that variation in their population genetics conforms to the predictions of the common theoretical paradigm: increasing fragmentation reduces gene flow and local genetic diversity and increases inbreeding and population genetic structure. We used a dataset of 9472 ASVs to test the hypothesis that black howler gut microbiome diversity decreases and heterogeneity increases with increasing fragmentation. While gut microbiome patterns conformed to our predictions, population genetic patterns did not: heterozygosity increased in the more fragmented part of the landscape, while inbreeding decreased. Population genetic structure decreased with increasing fragmentation. Using EEMS, we found that gene flow was highest in the most fragmented part of the landscape. Contrary to the theoretical paradigm that fragmentation creates isolated sub-populations, our results indicate that increasing forest fragmentation forced black howlers to move across the matrix more, not less. Our results highlight fragmentation's contradictory effects on different aspects of a single population's biology, and the importance of understanding



Pervasive edge effects of human settlements and plantations as revealed in Israel's State of Nature Report 2023

Ron Chen, Shira Grossbard, Ittai Renan, Ella Pasternak, Talia Gabay, Orr Comay, Ido Livne, Tomer Karni, Michal Koren

Hamaarag, Steinhardt Museum of Natural History, Tel-Aviv University

Habitat fragmentation from human activities poses a significant threat to biodiversity. While land conversion and physical barriers drive fragmentation, edge effects exacerbate it further. In Israel, rapid population growth and planning policies have intensified land conversion, worsening fragmentation. The State of Nature Report 2022 (Trends and Threats Volume), published by Hamaarag, revealed a 1.7% loss of core area due to fragmentation over five years. In the 2023 report (Biodiversity Volume), we further examined the effects of settlement and plantation edges on biodiversity. We analyzed a decade of data from the National Terrestrial Biodiversity Monitoring Program, spanning 900 plots near and far from settlements and plantations, across four taxa, and at 4-5 time points. Results show edge effects from human settlements and plantations deeply penetrate natural habitats. Species typical of the habitat tend to avoid these human-altered environments, while synanthropic species, which thrive in such areas, spread beyond their edges into natural landscapes. This effect is more severe in low-productivity ecosystems like grasslands and deserts, where the contrast between natural and human landscapes is stark. These findings suggest edge effects could hinder efforts to connect core areas with ecological corridors, particularly in bottlenecks, and should be mitigated to facilitate conservation efforts.



A network-based approach for mitigating the genetic outcomes of fragmentation

Ohad Peled, Gili Greenbaum

The Hebrew University of Jerusalem

Habitat fragmentation poses a significant threat to biodiversity, leading to isolated and inbred populations with reduced genetic diversity. Traditional models exploring the genetic outcomes of fragmentation often use simplified spatial structures. Our study integrates network science with population genetics to examine the effects of fragmentation on genetic diversity through three matrices: migration, coalescence, and F_{st} . We developed a framework that models genetic measures like heterozygosity and F_{st} across various fragmentation scenarios driven by anthropogenic activities. Our findings indicate that genetic changes vary significantly among fragmentation types, often showing non-linear patterns and rapid shifts that suggest qualitative transformations in population network structures. Additionally, we found that traditional assumptions linking genetic differentiation with geographic distance may not hold under fragmented conditions. Our results also support the use of genetic monitoring as an early warning system for detecting imminent population collapses. This approach offers an additional perspective for conservation management, focusing on maintaining genetic health and accommodating complex real-world connectivity patterns.



Predators, land use, and culling interactions shape community trophic dynamics

Shlomo Preiss-Bloom¹, Hila Shamon², Zachary Amir³, Dror Ben-Ami^{1,4}, Tamar Dayan^{1,5}

1. Tel Aviv University; 2. Smithsonian Conservation Biology Institute; 3. University of Queensland; 4. Compassionate Conservation Middle East; 5. The Steinhardt Museum of Natural History

The return of large carnivores to human-modified landscapes adds complexity to predator-prey dynamics. In the Golan Heights, apex predator, mesopredator, and prey species are legally culled to mitigate agricultural losses and human-wildlife conflict. While the effects of human and non-human predators are well-studied in undisturbed landscapes, the relative importance of predators and anthropogenic pressures in shaping wildlife communities has received little attention in fragmented landscapes. Here we examined the pressures of predation, culling, and land use on the Golan's large mammal community. Using 60 camera traps over 5,997 camera nights, we monitored the activity of grey wolf (*Canis lupus*), golden jackal (*Canis aureus*), wild boar (*Sus scrofa*) and the endangered mountain gazelle (*Gazella gazella*), and collated culling data for the first three. Our multi-method approach revealed that heavy culling in disturbed areas increased jackal activity and decreased boar activity. We also found that gazelles were most active in protected areas with higher wolf activity and least active in areas with higher jackal activity. Our findings highlight how the complex interactions between culling, land use, and predation pressures shape the structure of a large mammal community including an endangered species, offering conservation insights for multiuse landscapes.



Impacts of artisanal gold mining on giant otter populations and neotropical freshwater ecosystems

Adi Barocas¹, Alejandro Alarcon Pardo², Romina Camus², Claire Marr³, David W. Macdonald³,
Ronald R. Swaisgood²

1. Tel-Hai Academic College; 2. San Diego Zoo Wildlife Alliance Peru; 3. University of Oxford

Extractive activities, especially artisanal gold mining, are significant drivers of freshwater ecosystem degradation in the neotropics. Specifically, the distribution and abundance of top aquatic carnivores can be impacted by depletion of fish resources, contamination, and reduced water quality. We examined the influence of mining-related human disturbance on endangered giant otter populations. We carried out visual surveys, behavioral observations, fish sampling and water quality assessments in protected and impacted oxbow lakes of Peru's Madre de Dios region. Several lines of evidence suggested that freshwater ecosystem degradation impacts giant otter ecology. Extractive activities drove declines in fish richness and biomass and increased mercury accumulation in fish, resulting in resource-poor and contaminated habitats for giant otters. Accordingly, despite being found throughout gold mining regions, giant otter occurrence was lower in unprotected lakes. Behavioral sampling indicated reduced giant otter foraging efficiency in unprotected and fish-poor water bodies. We conclude that freshwater ecosystems impacted by gold mining create habitats that are habitable but suboptimal for giant otter groups. The results add to evidence of unprotected habitat degradation and human-driven deterioration of neotropical freshwater biodiversity. Possible mitigation strategies include community-based conservation, bank restoration and protection of specific freshwater bodies outside the main protected areas.



Movement patterns of the golden jackal (*Canis aureus*) in the Harod and Hamaayanot valleys for improving rabies management interface

Yehuda Samuel¹, Jonathan Tichon¹, Uri Weingarten², Roi Lapid³, Roni King⁴, Tomer Nissimian⁴, Ofer Steinitz⁴, Erez Ben Yosef⁴, Assaf Uzan⁴, Orr Spiegel¹

1. Tel Aviv University; 2. HNE Eberswalde; 3. HUJI; 4. INPA

The Harod and Hamaayanot valleys are a rabies frontier and serve as an ecological corridor that facilitates the spread of the disease to central Israel. The golden jackal, whose population in the valleys is observed to be growing, has been the main rabies vector in Israel in recent years. This study examines the movement patterns of jackals, using the ATLAS tracking system to study their behavior and improve rabies management. We found differences between sexes, with females unaffected by seasonality, while young males moved significantly farther during winter. Understanding jackal movement patterns is essential for improving the oral vaccination effort- the primary strategy of the INPA to manage rabies. The study involves capturing, tagging, and tracking jackals using the ATLAS system in the valleys, which generates high-accuracy and high-resolution movement data. Results from 52 captured jackals show an average home range of $16.8 \pm 1.2 \text{ km}^2$ (95%) and $5.8 \pm 1.2 \text{ km}^2$ (50%). Jackals used various habitats, especially abandoned fish ponds. Seasonal movement differences, along with age and sex, suggest that winter vaccination efforts should cover a 10 km radius. Additionally, young jackals may maintain regional connectivity during dispersal, indicating effective vaccination must complement ongoing culling in the valley.



Session E: Genetics in conservation

Evolutionary consequences of mercury pollution on avian bioindicators in the western Amazon

Tali Magory Cohen¹, Adi Barocas², Elsie Sunderland³, Michael Romero⁴, Victor Sanchez⁵,
Kristen Ruegg⁶, Rachael Bay⁷, Tom Gilbert⁸

1. Bar Ilan University; 2. Tel Hai Academic College; 3. Harvard University; 4. Tufts University; 5. Instituto de Investigación en Ecología y Conservación; 6. Colorado State University; 7. University of California Davis; 8. University of Copenhagen

Anthropogenic mercury pollution has led to dramatic ecosystem costs worldwide, particularly in biodiversity hotspots. In the western Amazon, mercury contamination has increased substantially due to Artisanal Small-scale Gold Mining (ASGM), yet its evolutionary impact remains understudied. We investigated evolutionary changes induced by long-term mercury exposure in wild avian populations in the Peruvian Amazon, documenting links between environmental mercury levels, tissue mercury loads, stress hormone (corticosterone) changes, and their genomic and transcriptomic backgrounds. Our results show that environmental mercury levels correlated significantly with bird tissue mercury loads, reflecting guild-dependent biomagnification processes. Corticosterone levels were lower in individuals with higher mercury loads, suggesting inhibited stress hormone recruitment and potentially lowered fitness. While only weak signals of population-wide genomic changes were detected, gene expression emerged as the primary mechanism correlated with mercury's evolutionary costs. Differential expression analysis revealed significant changes between birds from mercury-enriched and non-polluted environments, linked to enzymatic activity and cellular functions. Our findings provide insight into real-world costs of anthropogenic pollution in a major biodiversity hotspot, highlighting the urgent need for conservation strategies that address the broad-scale impact of environmental contaminants.



Lost genetic heritage: the wild olive trees of the Atlit Kurkar ridge

Dvora Low Ramati¹, Rona Winter-Livneh¹, Amir Perelberg¹, Elad Ben-Dor^{2,3}, Arnon Dag⁴, Oz Barazani²

1. Open landscape Institute, The Steinhardt Museum of Natural History, Tel Aviv University; 2. Department of Vegetable and Field Crops, Institute of Plant Sciences, Agricultural Research Organization; 3. The Robert H. Smith Faculty of Agriculture, Food and Environment, the Hebrew University of Jerusalem; 4. Department of Fruit Tree Sciences, Gilat Research Center, Agricultural Research Organization, Volcani Institute

Field surveys, phenotypic characterization, and genetic analysis of wild olives in the Atlit ridge were conducted to test if this population represents the ancestor of cultivated olives (*Olea europaea* subsp. *europaea* var. *sylvestris*). Following the research findings, construction plans in Atlit, which included permits to fell some of these trees, were revised. Due to proximity to the sea and local wind patterns, the Kurkar ridges around Atlit may harbor the last authentic remnant of this wild variety in the Middle East. The survey mapped 1,056 olives across 12 polygons in natural habitats, with up to 100 trees per polygon. Variables such as height, canopy structure, leaf characteristics, fruit load, and location were recorded. Leaves from 110 individuals were sampled for genetic analysis, and fruits were collected for oil content and morphological study. Results indicated a significant population of var. *sylvestris* in Atlit Kurkar ridges, though some sites within residential area showed hybridization with cultivated varieties. No significant correlations were found between genetic distances (F_{st}) and the phenotypic variables. Collaboration with the local environmental committee of the regional municipality facilitated swift integration of the research recommendations into actions to protect these unique genetic resources, highlighting the need for improved research-planning interfaces



Factors affecting female wild ass (*Equus hemionus*) social associations following a change in water-source distribution

Noa Y. Kan Lingwood¹, Alan R. Templeton², Daniel I. Rubenstein³, Amos Bouskila⁴, Shirli Bar-David¹

1. Mitrani Department of Desert Ecology, Ben-Gurion University of the Negev, Midreshet Ben-Gurion, Israel; 2. Department of Biology, Washington University, St. Louis, USA; 3. Department of Ecology and Evolutionary Biology, Princeton University, New Jersey, USA; 4. Life Science Department, Ben-Gurion University of the Negev, Beer-Sheva, Israel

Climate change and human activities have increasingly limited the availability of natural water sources, particularly in arid environments. One intervention has been managing artificial water sources, which, while providing essential drinking water, also influence space-use patterns, demography, and reproduction. Therefore, understanding the social structures of species affected by such management is essential. We studied factors affecting females' social associations in Asiatic wild-ass (*Equus hemionus*) following water-source management in the Negev Highlands, Israel. Employing a network approach based on genotypes, we correlated sociality, genetic relatedness, and reproductive success and examined the geographical locations of females in relation to water sources. Based on 2,014 fecal samples collected between 2020-2023, we identified 100 unique female genotypes, 57 of which demonstrated strong social ties. The social network revealed a significant correlation between sociality and genetic relatedness across multiple years ($p < 0.001$); however, no correlation was found with reproductive success ($p = 0.831$). Spatial analysis indicated that females with strong social associations tend to revisit similar areas over time. Importantly, the observation of strong social ties among genetically unrelated individuals might play a role in avoiding inbreeding.



Deep connections: exploring the genetic connectivity of mesophotic and shallow-water populations of the sponges *Axinella polypoides* and *Ircinia variabilis*

Tom Morav¹, Sergio Taboada², Liron Goren³, Tal Idan⁴, Sigal Shefer^{1,3}, Yaron Tikochinski³,
Carlota Gracia-Sancha⁵, Micha Ilan¹

1. School of Zoology, George S. Wise Faculty of Life Sciences, Tel Aviv University, Tel Aviv, Israel; 2. The Steinhardt Museum of Natural History, Tel Aviv University, Tel Aviv, Israel; 3. Faculty of Marine Sciences, Ruppin Academic Center, Mikhmoret, Israel; 4. Department of biomolecular sciences, the Weizmann Institute of Science, Rehovot, Israel; 5. Departamento de Biodiversidad y Biología Evolutiva, Museo Nacional de Ciencias Naturales (MNCN), CSIC, Madrid, Spain.

Over a decade ago, mesophotic sponge grounds (MSG; 80-130m) were discovered in the eastern Mediterranean Sea along the Israeli coast, with unparalleled local richness and diversity. Recent studies suggested that due to the MSG stable conditions, they might serve as a refuge for shallow-water species, and as a potential source for larvae to colonize shallow habitats, where current conditions (mainly rising water temperature) are harder. As such, some of these MSG have been promoted as marine reserves. To define an area as a refuge for other impacted regions, the connectivity between these areas must be determined. We investigated the genetic differentiation among shallow water and mesophotic populations of two sponge species, using ddRADseq. Interestingly, there is a genetic separation between the mesophotic populations and the shallow populations of *Ircinia variabilis*. In contrast, *Axinella polypoides* populations exhibited high gene flow between all populations. These differences of gene flow between the species might result from their distinctive reproductive strategy: while *A. polypoides* releases gametes into the water column, *I. variabilis* releases short-living larvae. Therefore, MSG role as a refuge, seems to depend on species-specific traits. To improve the success probability of conservation efforts, more scientific data of different species life history is needed.



Gene drives in combating biological invasions: minimizing the spillover risk by pesticide application

Sviatoslav Rybnikov, Gili Greenbaum, Adam Lampert

The Hebrew University of Jerusalem

The prospects for combating biological invasions using artificial suppression gene drives have been debated extensively during the last decade. Although gene drives can eradicate the population during just a few generations, they can spill over to non-target populations and drastically affect the ecosystem by eliminating or suppressing keystone species, thereby overshadowing the potential benefits of this technology. Here, we examine how adding traditional biocontrol methods before or after gene drive deployment can reduce the risk of such spillovers. We developed an optimal-control model that investigates cost-effective treatment strategies that account for the design of the gene drive and the trade-off between the cost of treatments and the potential damage of spillovers. We show that, all other things being equal, higher per-unit spillover costs necessitate earlier treatment - up to applying the pesticides before the gene drive deployment. In contrast, if the per-unit spillover costs are below a certain threshold, the treatment may be postponed to later generations or even abandoned, since the gene drives alone will eventually eradicate the population.



Taxonomic and ecological characterisation of the bubal hartebeest (*Alcelaphus buselaphus buselaphus*) of northern Africa and the Levant

Uri Wolkowski¹, Liora Kolska Horwitz², Nimrod Marom³, Meirav Meiri⁴

1. Department of Evolutionary and Environmental Biology, University of Haifa; 2. National Natural History Collections, The Hebrew University of Jerusalem; 3. School of Archaeology and Maritime Cultures, University of Haifa; 4. The Steinhardt Museum of Natural History, Tel Aviv University

The hartebeest (*Alcelaphus buselaphus*) is an antelope species with a historically extensive range throughout Africa. The northernmost populations disappeared from the Levant about 800 CE or later, and the North African population went extinct a century ago. Hunting and habitat loss are the presumed causes of extirpation. Here we lay out preliminary groundwork for its potential restoration. First, we determine the taxonomy of the Levantine hartebeest using aDNA, to find the closest living population; and second, model the present and future availability of the environmental niche of the hartebeest in Israel using Species Distribution Models (SDMs). We extracted aDNA from 21 archaeological hartebeest elements. Two samples yielded sufficient (0.4x) coverage of hartebeest mitogenome, confirming affinities with the extinct North African subspecies. We generated SDMs based on current distribution and extrapolated it to the Levant over different time periods. Different algorithms (GAM, MaxEnt, BART) indicate that the hartebeests climatic niche in the region is greater today than in the 8th century CE, and furthermore- will expand in the future under global warming scenarios. Coupled with low pastoral and hunting pressure and building on experience with other ungulates, this is the first step forward in potential reintroduction of hartebeest to the Levant.



Session F: Big data and broad patterns in conservation

Risk analysis of marine infrastructure to birds in Israel

Alon Rothschild¹, Eshel Ofir², Ateret Shabtay¹, Oded Sela¹, Daniel Oren¹, Yoav Perlman¹

1. The Society for the Protection of Nature in Israel; 2. The Hebrew University

The Israeli marine area, coastal and exclusive economic zone, is an important Euro-Asian - African birds' migration flyway. The importance of this area for birds is hardly recognized, as it is far from the public eye, and the majority of the birds migrate at night. Ocean sprawl is challenging the once open marine landscape, as more and more infrastructures are located in the marine environment. Some of those, like gas platforms, wind turbines etc., have a dimension above the sea level, and are illuminated artificially. Ocean sprawl is expanding, and concerns are raised regarding its potential risk for birds. Here, we surveyed the expected changes in the open landscape, in relation to baseline obstacles like large vessels in the Israeli territorial waters, based on AIS data. We evaluated the known spatial patterns of birds' migration and foraging in the Israeli Mediterranean, and the known and potential risks of marine infrastructures to birds. We assessed the relative risks for different birds' guilds from various types of marine infrastructures. We conclude that a strategic environment survey and data collection should precede any substantial plan for infrastructures in the Israeli marine area.



A new international nature conservation index to assess countries' conservation performance

Yaron Ziv¹, Alex Slavenko², Assaf Levy³, Shai Meiri⁴, Uri Roll¹

1. Ben-Gurion University; 2. Cesar Australia; 3. BioDB; 4. Tel-Aviv University

Biodiversity conservation is essential for mitigating climate and environmental crises by protecting ecosystems critical to life-support systems. While abundant biodiversity data and information exist on countries' commitment to nature protection, there is no unified index to synthesize and present this information for effective global conservation strategies. We propose an international, country-oriented Nature Conservation Index (NCI), a tool to evaluate country-level biodiversity conservation effectiveness across four pillars. The first pillar, Land Management, assesses habitat protection through indices such as protected area coverage. The second pillar, Threats to Biodiversity, measures risks to species, considering factors like extinction threats and population decline. The third pillar, Capacity and Governance, evaluates national commitment, including conservation laws and fiscal measures. The fourth pillar, Future Trends (using Yale's Environmental Performance Index), focuses on climate policies and forward-looking conservation strategies. By consolidating high-quality data, the NCI provides countries with a clear metric to assess their conservation progress and identify areas for improvement. It also has the potential to guide international bodies in promoting incentives or sanctions for particular countries, supporting global sustainability efforts.



Twenty-five years of Israeli coastal dolphins' population conservation research: from inspiration to implementation

Aviad Scheinin

Morris Kahn Marine Research Station, Leon H. Charney School of Marine Sciences, University of Haifa; Delphis

Our long-term ecological research focusing on the coastal dolphin population in the Israeli Mediterranean Sea takes a holistic approach. It is based on three main sources of data: 30 years of cetaceans stranding examining 436 carcasses, 25 years of observational boat-based surveys with the effort of more than 50,000 km in over 1300 surveys and recorded over 400 dolphin sightings, and five years of continual passive acoustic data from 5 monitoring stations. Coastal dolphins are present constantly in Israeli waters year-round. Two dolphin species reside on the Israeli coast: the common bottlenose dolphin *Tursiops truncatus* (Least Concern, IUCN) and the common dolphin *Delphinus delphis* (Endangered, IUCN). *T. truncatus* is found along the entire coast with a stable population in all areas of the continental shelf where survey effort coverage was sufficient, with a high affinity towards bottom trawlers, and *D. delphis* is found only in the south in shallow waters, with a decreasing trend of population size. This information is based on photo-identification and mark-recapture methodologies for the two species. The outcome of this research led to the announcement of the Coastal Shelf of Israel as an Important Marine Mammal Area - IMMA by the Marine Mammal Protected Areas Task Force, IUCN.



The global biomass of mammals since 1850

Lior Greenspoon¹, Noam Ramot¹, Uri Moran¹, Uri Roll², Rob Phillips³, Elad Noor¹, Ron Milo¹

1. Weizmann Institute of Science; 2. Ben-Gurion University of the Negev; 3. California Institute of Technology

Mammals are of central interest in ecology and conservation science. Here, we estimate the temporal biomass trajectory of all mammals including humans, domesticated and wild mammals using a variety of data-driven methods. We find that in the year 1850, the combined biomass of wild mammals was ~ 200 Mt (million metric tons), roughly equal to that of humanity and its livestock at the time. Since then, human and livestock populations have grown rapidly, reaching their current combined biomass of ~ 1000 Mt. During the same period, the total biomass of wild mammals has decreased at least by half. While fewer than 2% of marine mammal species were deemed extinct since 1850, we show that this group has undergone a 70% decline in its global biomass during this period. Biomass thus serves as a complementary key metric for tracking the status of wildlife beyond species extinctions. This work provides a quantitative perspective on the rapid human-induced shift in the composition of mammalian biomass over the past two centuries.



Benthic habitats representativeness in marine protected areas in Israeli territorial waters - existing state and recommendations for the update of the maritime policy and vision document

Ateret Shabtay¹, Alon Rothschild¹, Danielle Oren¹, Oded Sela¹, Nir Angert², Ori Frid², Edna Guk², Ruth Yahel²

1. The Society for the Protection of Nature in Israel; 2. Israel Nature and Parks Authority

In 2022, nations committed to conserving at least 30% of marine areas, focusing on biodiversity hotspots through well-managed and ecologically representative protected areas. The representativeness principle, key to preserving diverse habitats, is acknowledged in Israel's Maritime Policy and Vision for the Mediterranean. This study evaluates whether the policy, which is currently undergoing an update process, aligns with new global conservation targets. Spatial analysis of benthic habitat distribution in Israel's Mediterranean waters shows that current marine protected areas (MPAs) inadequately represent several habitats. Total conserved areas remain below the 30% target, particularly for unique benthic and deep soft-bottom habitats. To achieve better representation, reclassifying "special marine areas" as "search zones for MPAs" is recommended. Updating the Maritime Policy and Vision document offers an opportunity to incorporate current scientific knowledge and close conservation gaps. Key recommendations include: 1) Redesignating "special marine areas" as "search zones for MPAs" to enhance habitat representation; 2) Expanding MPAs to include unique sites like pockmarks in the Dor Slide, Hof HaCarmel Islets, the mesophotic kurkar ridge offshore Naharia, and Ashdod; and 3) Spatially expanding protection for soft-bottom habitats, especially those below 30m depth, threatened by bottom-trawl fisheries.



Ancient agriculture systems in the Negev - mapping, locating and developing tools for preservation and restoration, to promote heritage, cultural and ecological values.

Shai Scharfberg¹, Rona Winter-Livneh¹, Yaara Rosner², Guy Shelef², Yoav Avni³, Gideon Avni⁴,
Uri Ramon¹

1. Open Landscape Institute (DESHE), The Steinhardt Museum of Natural History, Tel Aviv University; 2. Landscape Architecture; 3. Geological Survey of Israel; 4. Israel Antiquities Authority

Ancient agricultural systems have an important role in delaying desertification processes, to preserve soils' fertility as well as to preserve biodiversity in open areas. Using GIS, we located over 120,000 dunams of agricultural terraces in the Negev region. Our study found that approximately only 16% of terrace areas are located within protected areas, additional 26% are found in declared antiquities areas, while the rest, about 58% of the terraces are located and exposed to erosion processes in non-protected areas. In these non-protected areas, an assessment was made to locate areas for prioritization for the preservation of the terraces based on weighting environmental and scenic indicators. In addition, we studied planning mechanisms and their reference to terraces in areas adjust to settlements and agriculture areas. Our work indicates that in the absence of background layer as a basis for planning, the terraces are not directly addressed, and are thus actually more vulnerable to damage due to future development. An integration of restored terraces and establishment of new terraces in traditional construction should be considered as part of the scenic array in existing and/or potential settlements as a continuous cultural landscape.



Session G: Applying insights from animal behavior in conservation

Southbound migration timing and routes of GPS tagged European turtle-doves from Israel

Yoav Perlman^{1,2}, Nir Sapir³, Frédéric Jiguet⁴

1. BirdLife Israel; 2. The Society for the Protection of Nature in Israel; 3. University of Haifa; 4. Muséum National d'Histoire Naturelle

Understanding migration timing, stopover locations and overwinter regions of threatened birds is crucial for their conservation, especially if they are targeted for hunting. The European turtle-dove (TD) is threatened both globally and in Israel. Despite this, it is still huntable across much of its range, including in Israel. In 2022 and 2023 16 TD were tagged in northern Israel using lightweight GPS transmitters equipped with solar panels. For 12 birds, four adults and eight juveniles, migration departure dates were recorded. We obtained data from seven tagged TD through their migration journey to Africa, showing similar paths down the Gulf of Aqaba, across the Red Sea. The birds stopped in palm plantations and cultivation along the Nile in southern Egypt, highlighting the importance of the Nile as a migration stopover corridor. Two TD provided information on their overwintering areas in northern South Sudan and southern Sudan. Both TD made it back to northern Israel in the subsequent spring for breeding. One of them provided full information of its northward migration route in spring. These data were provided to relevant government agencies when deciding about a new hunting policy, leading to a year-long extension of a temporary hunting ban from August 2024.



Integrating empirical and theoretical approaches to investigate the endemic and critically endangered Beer Sheva fringe-fingered lizard

Sefi Horesh^{1,2,3}, Ofer Ovadia^{1,4}

1. Department of Life Sciences, Ben-Gurion University of the Negev; 2. Midbarium Animal Park; 3. INPA; 4. The Goldman Sonnenfeldt School of Sustainability and Climate Change, Ben-Gurion University of the Negev

Anthropogenic changes accelerate climate change and biodiversity loss, with high extinction rates. This study focused on creating a mechanistic distribution model for the endemic and critically endangered Beer Sheva fringe-fingered lizard (*Acanthodactylus beershebensis*). I present key findings from my PhD research, where I integrated empirical and theoretical approaches along with *in-situ* and *ex-situ* data collection to construct models and used them to predict how futurist scenarios are expected to affect the population dynamics and extinction risk of *A. beershebensis*. First, a correlative species distribution model was created. Next, stage-structured periodic population models were constructed. Finally, using a mechanistic approach, integrating demography and dispersal dynamics, a temporal and spatially explicit species distribution model was constructed. Simulations included predicted future habitat loss and examined the effect of a theoretical reintroduction program. Results show that under current conditions, with or without further habitat loss, the population will decrease to below 2,000 individuals within 47 years. In addition, the results of the models show that a reintroduction program could assist in increasing population growth rates. Finally, the model recognizes areas of highly predicted occurrences with suitable habitats and low anthropogenic disturbances, which may serve as potential final refuges for this species in the wild.



High-resolution tracking of the invasive common myna (*Acridotheres tristis*) in the Negev highlands

Klil Shaha¹, Tamir Rozenberg², Krista N. Oswald², Uri Roll², Oded Berger-Tal²

Albert Katz International School for Desert Studies, The Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev; Mitrani Department of Desert Ecology, Swiss Institute for Dryland Environmental and Energy Research, The Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev

The common myna, one of the world's worst invasive species, has negative effects on many species and ecosystems. Despite much research and conservation efforts, its spread and establishment in new regions is not fully understood, especially in arid environments. We aimed to characterize myna movement and use of natural and modified desert habitats in the Negev highlands. We used a novel tracking technology, which provides a high spatiotemporal resolution, to track over 30 individuals, each for an average of 100 days between April 2023 and April 2024, over an area ~ 17 km². Mynas showed a significant preference for settlements and other disturbed habitats, where they spent most of their time. Although their daily home ranges were small (0.6 km² on average), many individuals moved frequently between settlements (distances of 2-3 km). Moreover, mynas used several roost locations during the tracking period, and changed the congeners they roosted with. Most long-distance daily movements occurred during either early mornings or late afternoons; birds roosted in one area, foraged in another, and returned on the same day. This behavior varied greatly among individuals. Our results indicate that mynas desert environments rely on anthropogenic resources but are not limited to specific patches.



Variation in tolerance behavior of the threatened Nubian ibex inside human settlements is shaped by people's behavior

Yuval Zukerman¹, Anne Hertel², Niels Dingemanse², Oded Berger-Tal¹

1. Mitrani Department of Desert Ecology, Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev; 2. Department of Biology, Ludwig-Maximilians University of Munich, Germany

Tolerance to humans enables some wildlife populations to inhabit human habitats and often leads to human-wildlife conflict. To improve our ability to mitigate such conflicts, we investigated the tolerance behavior of threatened Nubian ibex (*Capra nubiana*) within human settlements. We studied the behavior of 29 tagged females from two separate populations inhabiting two settlements in the Negev desert of Israel: Mitzpe Ramon (MR), and Midreshet Ben Gurion (MBG). The settlements differ in size and human attitudes towards the ibex (MR being larger and with a larger number of tourists). We repeatedly measured the flight initiation distance of individual ibex when a human or a human with a dog approached them. We also performed social network analyses and calculated individual home-ranges. Our findings revealed distinct social groups within the MR population, with individual tolerance behavior aligning with their group associations and the characteristics of the urban areas they inhabit – residential, touristic, or natural. In contrast, the MBG population exhibited a cohesive social structure, with minimal variation in tolerance behavior among individuals. These results highlight the critical role of human attitudes in shaping human-wildlife conflict, offer practical recommendations for conflict mitigation, and provide insights into wildlife adaptations to changing environments.



Ageing in nature: examining lifelong changes in movement and social behavior of Griffon vultures (*Gyps fulvus*)

Orr Spiegel¹, Marta Acácio¹, Kaija Gahm², Nili Anglister¹, Gideon Vaadia¹, Roi Harel³, Ohad Hatzofe⁴, Ron Efrat⁵, Ran Nathan⁶, Noa Pinter-Wollman²

1. University of Tel Aviv; 2. University of California, Los Angeles, United States of America; 3. Max Planck Institute of Animal Behavior, Konstanz, Germany; 4. Israeli Nature and Parks Authority, Jerusalem, Israel; 5. Mitrani Department of Desert Ecology, Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev, Midreshet Ben-Gurion, Israel; 6. The Hebrew University of Jerusalem, Jerusalem, Israel

Studying the mechanisms shaping age-related changes in behavior ('behavioral aging') is important for understanding population dynamics. Here, we used a 15-yr GPS-tracking dataset of a social obligate scavenger, the Griffon vulture (*Gyps fulvus*), to investigate age-related changes in movement and social behaviors, and disentangle the role of behavioral plasticity and selective disappearance in shaping such patterns. We tracked 142 individuals for up to 12 years and found a nonlinear increase in site fidelity with age: a sharp increase in site fidelity before sexual maturity (<5 yr old), stabilization during adulthood (6 to 15 yr), and a further increase at old age (>15 yr). This pattern resulted from individuals changing behavior throughout their life (behavioral plasticity) and not from selective disappearance. Mature vultures also increased the predictability of their movement routines and spent more nights at the most popular roosting sites compared to younger individuals. These changes in site fidelity and movement routines were mirrored in changes to social behavior. Older individuals interacted less with their associates, particularly during the breeding season. Our results reveal a variety of behavioral aging patterns in long-lived species and underscore the importance of behavioral plasticity in shaping such patterns. Comprehensive longitudinal studies are imperative for understanding how plasticity and selection shape the persistence of wild animal populations facing human-induced environmental changes.



Cascading effects of anthropogenic food on golden jackals (*Canis aureus*) and mountain gazelles (*Gazella gazella*) in a peri-urban environment

Amir Arnon¹, Torsten Wronski², Dan Malkinson^{3,4}, Ido Izhaki⁵, Miranda Davis⁶

Ramat Hanadiv; 2. Liverpool John Moores University, School of Biological and Environmental Sciences; 3. University of Haifa, The School of Environmental Science; 4. University of Haifa, Shamir Research Institute; 5. University of Haifa, Evolutionary and Environmental Biology; 6. University of Connecticut, Ecology and Evolutionary Biology Department

Understanding the complex relationships between predators and prey is crucial, especially in peri-urban areas where human-driven changes can disrupt these natural dynamics. In this study, we investigated the impacts of increased anthropogenic food availability and cattle ranching on an endangered mountain gazelle population in a Mediterranean nature park. Using data from over 700 gazelle surveys, conducted over 17 years, we found that diversionary feeding for omnivores (e.g., jackals and wild boar), prescribed to curb human-wildlife conflicts, negatively impacted the gazelle population, likely through increased predation. After the feeding stopped, the gazelle population nearly doubled. In contrast, cattle ranching did not affect the gazelles. Further evidence emerged several years later when camera traps indicated a resurgence in jackal activity, coinciding with a drastic decline in gazelle density. Targeted jackal control measures effectively reduced their activity, followed by a halt in gazelle decline, and the onset of recovery. These findings highlight the importance of managing peri-urban habitats to control predator populations. Most importantly, reducing anthropogenic food resources combined with selective predator control can be effective strategies for conserving vulnerable wildlife in human-dominated landscapes.



Session H: Applications of unorthodox tools in conservation

Using machine learning to establish a new monitoring method for a wild population of Arabian oryx (*Oryx leucoryx*)

Tal Polak¹, Arnon Karnieli², Micha Silver², Shirli Bar-David²

1. Israel Nature and Parks Authority; 2. Ben-Gurion University of the Negev

Population reintroduction is a time- and resource-consuming practice, requiring constant monitoring to evaluate the long-term survivorship of the reintroduced population. The Arabian oryx (*Oryx leucoryx*) in Israel was reintroduced between 1997-2007 in several large reintroduction events. From 2017 the reintroduction program was renewed with small hard-release events with GPS-collared individuals. Our goal was to use readily available aerial-photographs to count the Arabian oryx population. The aerial photographs were produced by Survey of Israel. The photographs were taken with a resolution of 20cm, which allowed us to use them for animal counts. Using the image recognition AI tool YOLOv8 by ULTRALYTICS, we trained the model to recognize oryx from aerial photographs. The analysis was done on several selected polygons (for a total area of 293 km²) from the oryx roaming habitat (which spans over 1000 km²). The model, following visual screening, found more than 100 oryx in the tested area, a number which now can be extrapolated to estimate the total population size within the species' range. This is the first method which manages to systematically count Arabian oryx individuals in the wild. Using this method saves money, time and increases accuracy and repeatability in a cost-effective manner.



Leveraging large language models for social media image analysis in conservation sociology

Victor Rina (China)¹, Enav Vidan², Yoram Yom-Tov³, Uri Roll²

1. Jacob Blaustein Center for Scientific Cooperation, The Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev, Midreshet Ben-Gurion, Israel; 2. Mitrani Department of Desert Ecology, The Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev, Midreshet Ben-Gurion, Israel; 3. School of Zoology, Tel-Aviv University, Tel-Aviv 6997801, Israel.

The application of large language models (LLMs) offers transformative potential for conservation sociology by automating the analysis of social media images to understand visitor engagement and preferences. In this study, we used the Claude API to analyze over 1,000 Instagram images from six birding sites in Israel, using image-to-text generation to identify key features, attractors, and visitor emotions. By comparing manually labeled data with automatically generated labels, we demonstrated that LLMs can accurately capture relevant visual and emotional elements. Our findings show that LLMs can significantly reduce the need for manual labeling, which is often time-consuming, resource-intensive, and not real-time. Automating this process provides conservation managers with efficient, scalable tools for real-time analysis, enhancing site management and visitor appeal. This streamlined, cost-effective approach supports data-driven conservation strategies, making LLMs a valuable asset in modern conservation efforts.



**Utilizing social media to monitor the endangered spinetail devil ray (*Mobula mobular*)
fishery in the Gaza strip, southeastern Mediterranean**

Re'em Neri, Adi Barash, Inbal Kahan

Sharks in Israel

The Gaza strip hosts the only documented targeted fishery for the critically endangered spinetail devil ray (*Mobula mobular*) in the Mediterranean Sea. Monitoring fisheries in this conflict zone is challenging, leading to significant knowledge gaps. We utilized a novel approach, mining social media data to investigate *M. mobular* ecology and fisheries in Gaza. Systematic analysis of Facebook posts from local fishing communities and news sources identified 54 fishing events, recording 470 specimens between 2013 and 2024. The data revealed seasonal fishing activity from January to April, with purse seine nets as the primary gear. Catches were limited to within 15 nautical miles from shoreline, the maximum fishing range allowed under the marine blockade. This zone, where depth gradients rapidly transition from 100-150 meters to 500-700 meters, coincides with the continental shelf edge, suggesting possible mating or migratory aggregations. Daily videos from fish markets allowing high resolution remote market surveys (2020-2023) confirmed the absence of *M. mobular* outside the known fishing season. Therefore, the data collected is giving reliable knowledge on the species risks in the area.



Using 'junk' acoustic data for monitoring the state of coral reefs

Yuval Mendelson¹, Renanel Pickholtz¹, Jonathan Belmaker^{1,2}, Yossi Yovel^{1,3}

1.School of Zoology, George S. Wise Faculty of Life Sciences, Tel-Aviv University, Tel Aviv 6997801, Israel; Steinhardt Museum of Natural History, Tel-Aviv University, Tel Aviv 6997801, Israel; Sagol School of Neuroscience, Tel Aviv University, Tel Aviv 6997801, Israel

Coral reefs are deteriorating worldwide, but their conservation is impeded by a lack of cheap and efficient methods to monitor their state over space and time. In this regard, bioacoustics monitoring is an emerging tool, which allows for continuous monitoring over long periods. In this work, we show that simple low-resolution acoustic data that is a by-product of widespread acoustic tracking arrays can provide a good assessment of coral reef states. We show that narrow-band noise at 71 kHz corresponds to different features associated with biophonic events, such as tidal cycles, lunar cycles, and seasons, and less to anthropogenic noises associated with holidays versus non-holidays or weekends versus weekdays. As a case study for monitoring, we examine changes to noise levels associated with a large storm that occurred in Eilat in March 2020. We find a significant reduction in noise levels followed by a recovery, corresponding to the documented changes in the state of the reef. We also compared the noise levels to visual fish surveys and showed similar trends. As similar acoustic arrays are deployed in many regions, this simple method can be easily implemented for monitoring invertebrate and fish coral reef states.



**Poaching of a priceless gazelle does not pay - demand for ecological restitution through
civil lawsuits as a deterrent to illegal hunting**

Noam Leader¹, Yariv Malihi², Nadav Ganot², Shai Peretz³

1.Science Division, Israel Nature and Parks Authority; 2. Central District, Israel Nature and Parks Authority; 3. Legal Department, Israel Nature and Parks Authority

Illegal hunting of endangered mountain gazelles (*Gazella gazella*) in Israel poses a major threat for the survival of this iconic protected species. Current criminal court sentencing of gazelle poachers, however, are too lenient to cause effective deterrence. Civil lawsuits aim to hold offenders accountable for illegal hunting that threaten species survival. A primary goal is deterrence by imposing substantial financial penalties. Circumventing problematic approaches of setting 'the value of a gazelle' in a civil lawsuit, we focused on establishing the ecological damage caused, restoration possibilities and their cost. We used population viability modelling to simulate demographic consequences and necessary restoration actions, from a single gazelle poaching event. We found: 1. A dramatic negative effect on herd size and survivability, indicating the importance of each gazelle's direct and indirect breeding potential during their lifetime, and during three generations. 2. Restoration requires captive breeding and successful reintroductions to the local gazelle herd. 3. Translating these results to a successful operative conservation plan would require a budget exceeding 600,000 NIS. Civil lawsuits are a powerful tool for enforcing conservation laws, ensuring whoever harms wildlife is held accountable for their actions. We recommend quantifying direct ecological damages and imposing remediation costs on the offender.



Inspiration to implementation: advancing conservation through a catch-and-release shark program - Israel's *in-situ* lab

Leigh Livne, Eyal Bigal, Ziv Zemah-Shamir, Dan Tchernov, Aviad Scheinin, Dalit Meron, Danny Morick

Morris Kahn Marine Research Station, University of Haifa

Sharks have been reported around the warm-water effluent of power plants and along the coastline for 40 years in Israel. Early research identified winter aggregations of dusky and sandbar sharks near Hadera, providing a unique opportunity for long-term monitoring of these endangered species. The Apex Marine Predator Laboratory has initiated the first and only long-term shark tagging research in the Mediterranean Sea to utilize this easy-access, *in-situ* laboratory to tag and sample 115 sharks using acoustic, visual, and satellite methods. Advanced techniques such as drone photogrammetry, acoustic surveys, mark-recapture, underwater observations, and molecular analyses (blood, microbiome) are used as monitoring tools. Leveraging insights from over 90,000 acoustic detections and tissue analyses, our study revealed that dusky sharks exhibit short-term site fidelity with increasing body temperatures during three-day 'visits.' Additionally, two distinct lineages have been identified as conversing in one aggregation, the first documented in the literature. All scanned female dusky sharks were gravid, utilizing our study site during the early- to mid-stages of gestation. These sharks remain in the Levantine sea when not detected in Israeli waters during the winter (June-November). All data generated is made available through an open-access database, marking a pioneering effort in marine research within Israel.

Poster Abstracts

Sunday, Oct. 27th

The MECO project (Mediterranean Elasmobranch Citizen Observation): using social media to create a regional database of elasmobranch observations

Adi Barash¹, Y. Grossmark², I. Giovos³, S. Tuncer⁴, A. Zilifli⁴, A. Ulman⁵, J. Penadés-Suay⁶, I. Nuez⁷, M. Lapinski⁸, R. Naasan Aga -Spyridopoulou³, S. A. A. Al Mabruk⁹, C. Romano¹⁰, E. Sperone¹¹, P. L. Jambura¹², J. Türtcher¹², G. Nowell¹³, P. Ugarković¹⁴, I. Cetkovic¹⁵, R. Neri¹⁶, S. B-S. Rothman¹

1. The Steinhardt Museum of Natural History, Tel Aviv, Israel; 2. Faculty of Architecture and Town Planning, Technion – Israel Institute of Technology, Haifa, Israel; 3. iSea, Environmental Organization for the Preservation of the Aquatic Ecosystems, Greece; 4. MarineScience and Limnology Department, Çanakkale Onsekiz Mart University, Turkey; 5. Mersea Marine Consulting, Fethiye, Turkey; 6. Associació LAMNA per a l'estudi dels elasmobranquis de la Comunitat Valenciana, Spain; 7. SUBMON® – Awareness, study and conservation of the marine environment, Spain; 8. AILERONS Association, University of Montpellier, France; 9. Department of Marine Resources, Omar Al-Moukhtar University, El Bayda, Libya; 10. Department of Biology, Earth Science and Ecology, University of Calabria, Italy; 11. Department of Biology, Earth Science and Ecology, University of Calabria, Italy; 12. Department of Palaeontology, University of Vienna, Vienna, Austria; Shark lab Malta; Independent researcher; University of Montenegro - Institute of Marine Biology, Kotor, Montenegro; Ben-Gurion University of the Negev, Israel

Global conservation of elasmobranchs (sharks and rays) is significantly hindered by insufficient data. Lack of basic information on elasmobranchs' occurrence and distribution is particularly severe in the eastern Mediterranean, where research is scarce and historical data are minimal, and over 50% of species are at risk. The Mediterranean Elasmobranch Citizen Observation (MECO) project is an international citizen-science initiative, that has been working to fill these gaps by collecting past and present observations from social media platforms. Local scientists across 11 countries collaborate to create a database, currently consisting of over 12,000 verified elasmobranch observations reported by divers, fishermen, and sea-goers. Each verified observation is cataloged with detailed information, including date, location, species, and environmental context. For example, from data collected on *Mobula mobular*, a possible migration pattern emerges, from the eastern Mediterranean during winter to the western Mediterranean in summer. This finding is based on sightings along Mediterranean coastlines between winter and autumn, beginning in Gaza and ending in France. The MECO project has demonstrated that engaging the public can yield a wealth of data previously unattainable by traditional methods, contributing to much-needed conservation efforts.



Is it hot? Tracking parrotfish behavior during eight marine heatwaves in the Red Sea

Dan Bez Golanski^{1,2}, Renanel Pickholtz¹, Moshe Kiflawi^{3,4}, Gitai Yahel², Jonathan Belmaker^{1,5}

1. School of Zoology, George S. Wise Faculty of Life Sciences, Tel-Aviv University, Tel Aviv 6997801, Israel; 2. Faculty of Marine Sciences, Ruppin Academic Center, Michmoret 4029700, Israel; 3. Department of Life-Sciences, Ben-Gurion University of the Negev, POB 653, 84105, Beer-Sheva, Israel; 4. The Interuniversity Institute for Marine Sciences of Eilat, 88103, Eilat, Israel; 5. Steinhardt Museum of Natural History, Tel-Aviv University, Tel Aviv 6997801, Israel.

Marine heatwaves (MHWs) are periods of prolonged, discrete anomalously warm seawater events. MHWs have shown a notable increase in duration, intensity, and frequency over the past century, with projections indicating a continued escalation in the near future. Documented responses of fish to MHWs include mass mortalities, transient or semi-permanent range shifts, and alterations in reproductive behaviors. While previous *in situ* studies have focused on population and community-level impacts, the effects at the individual level remain understudied. Individual behavior has already been proven to significantly affect population and community dynamics. An enhanced understanding of MHWs' impacts on individual behavior and the recovery duration may elucidate the diverse patterns reported in the literature at higher ecological levels. In this study, we used acoustic telemetry to explore parrotfish behavior during and after eight MHWs, which occurred between 2016 and 2020, in the Gulf of Aqaba in the Red Sea. Parrotfish play a critical role in coral reef ecosystems through their herbivory and bioeroding activities and are known to be vulnerable to MHWs. We monitored the activity levels and spatial distribution (depth and horizontal location) of 2-13 parrotfish per MHW before, during, and after the events, and found only a low behavioral response.



Seaweeds of the Israeli seas: exploring ecological and biotechnological potential through species diversity and seasonality

Doron Ashkenazi^{1,2}, Álvaro Israel², Avigdor Abelson¹

1. School of Zoology, Tel Aviv University, Ramat Aviv, Israel; 2. the Israel Oceanographic & Limnological Research Ltd. (PBC), Tel Shikmona, Haifa, Israel

This study presents a long-term ecological survey of the natural seaweed population along the Israeli intertidal coastline, investigating their biodiversity and dynamic changes both spatially and temporally. Additionally, the survey includes a chemical analysis of local seaweed species, assessing their beneficial metabolites. This combination represents the first study of its kind published in Israel. Seaweeds are rich in nutritional and medicinal bioactive compounds, offering key ecosystem services such as nutrient mitigation, oxygen production, and carbon sequestration, important for combating climate change. Despite their important attributes, no systematic ecological surveys of seaweeds have been conducted in the Israeli Mediterranean Sea since the late 1990s, and chemical screening of local species is lacking. The survey provides an updated overview of seaweed assemblages across six sites, including the Mediterranean Sea and Eilat. A seasonal growth shift was observed, and protein levels, antioxidants, and natural sunscreen compounds were analyzed in dominant seaweeds. We propose that the extreme abiotic conditions of the Israeli Mediterranean may foster unique, resilient species with significant biotechnological and ecological potential. These species might become dominant in other regions worldwide due to climate change. These findings offer valuable insights for conservation efforts and the sustainable exploitation of Israeli seaweeds.



The importance of biome in shaping urban biodiversity

Eleanor Diamant¹, Krista N. Oswald¹, Adewale G. Awoyemi^{2,3}, Kevin J. Gaston⁴, Ian MacGregor-Fors⁵, Oded Berger-Tal¹, Uri Roll¹

1. Ben Gurion University of the Negev; 2. University of Granada; 3. International Institute of Tropical Agriculture; 4. University of Exeter; 5. University of Helsinki

Humanity is urbanizing, with vast implications on natural systems. To date, most research on urban biodiversity has centered on temperate biomes. Conversely, drylands, collectively the largest terrestrial global biome, remain understudied. Here, we reviewed the literature and synthesized key mechanistic differences of urbanization's impacts on biodiversity across these biomes. We highlight how irrigation shapes dryland urban ecology, leading to greener, sometimes more biodiverse, landscapes than local wildlands. These green urban patches in drylands often have different species composition, including many non-native and human-commensal species. We further discuss how socioeconomic factors, locally and globally, shape urban biodiversity patterns differently between biomes. We advocate for more research in low-income dryland cities, and for implementing biome-specific and scientifically-grounded management and policies.



**Conservation genetic strategies for the Hula painted frogs (*Latonia nigriventer*) by
assessing habitat preference**

Franklin Sargunraj

Tel Aviv University

Hula painted frogs (*Latonia nigriventer*), a critically endangered amphibian species residing in the Hula Valley, face a need for conservation due to habitat degradation exacerbated by human activities. To address this urgency, my research integrates genetic methods and habitat analysis. Environmental DNA (eDNA) techniques are employed for habitat mapping, offering insights into the distribution of Hula painted frogs and co-inhabiting amphibian species. Real-time PCR results revealed a strong signal at the reference site, with Hula painted frog eDNA traces detected in nine different locations in the Agamon area of the Hula Valley and absence noted in six sites. Simultaneously, I explored the invertebrate communities in Hula painted frog eDNA-positive and -negative sites. Invertebrate species identification and metabarcoding enhances our insight into Hula painted frogs' habitat preferences.



Wildflower-strips to conserve biodiversity in desert agriculture

Jessica Schäckermann^{1,2}, Laura Brohm¹, Ebby Soita¹, Joshua Ezra Epstein¹, Michal Segoli³,
Noam Weiss^{4,5}, Carmi Korine³

1. The Arava Institute for Environmental Studies, Ben Gurion University of the Negev; 2. Southern Arava R&D; 3. Ben Gurion University of the Negev; 4. Society for the Protection of Nature in Israel; 5. International Birding & Research Center Eilat

The Arava desert hosts intensive agriculture which impacts natural habitats and their fauna and flora. Wildflower-strips adjacent to agriculture are known to provide artificial habitats for biodiversity, counteracting this loss and enhancing ecosystem services. However, the use of flower-strips has rarely been studied in arid environments. Native flowering in the Arava desert occurs after flash floods in winter. The blooming desert plants attract a diversity of arthropods, birds, and mammals. This study aims to use flower-strips to attract diverse animal groups to agricultural sites and enhance ecosystem services, creating a possible win-win situation for nature and farmers. We tested the potential of native desert plants for flower-strips, both in net houses and in the field. We found that 10 of the 14 tested plants produced flowers. We further investigated their attractiveness for insects next to date plantations and found that several orders of insects including bees, wasps, flies, and hoverflies were attracted. These results indicate that flower-strips can potentially conserve biodiversity and enhance connected ecosystem services in arid agroecosystems. Future studies will aim to understand the attractiveness of flower strips for natural enemies that feed on pests such as wasps, birds, and bats.



Effects of microplastic on a native coastal plant

Noy Kaminer Bitton, Ines Zucker, Michal Gruntman

Tel-Aviv University

Plastic contamination presents major environmental threats for ecosystem conservation, through its degradation into micro-sized particles that are harmful to a variety of organisms, including plants. Among terrestrial habitats, coastal dunes are likely one of the most plastic-polluted, but very few studies thus far examined microplastic effects on wild plants native to this habitat. Our research examined the effects of microplastics from biodegradable and non-biodegradable origin, in their pristine (raw) and weathered form, on the endemic coastal plant *Cutandia maritima*. We first synthesized weathered microplastics of high environmental relevancy from bulk plastic products. Then, we exposed *C. maritima* to the microplastics in the soil. Though no effect was found on the plants following chronic exposure to all microplastic types, weathered plastic in the maternal environment delayed seed germination (for both biodegradable and non-biodegradable plastic), suggesting epigenetic modifications might have an effect at the embryo stage. Our results highlight the importance of studying the effects of microplastic on seed germination and raise the chronic ecological consequences of environmental microplastic contamination on the fate of coastal plant populations, especially in light of the increase in plastic production.



Sea level rise implications on land vertebrates' distributions

Roe Ben Nissan^{1,2}, Uri Roll¹, Ron Milo², Yuval Itescu³, Celine Bellard⁴, Shai Meiri⁵

1. Ben Gurion University of the Negev; 2. Weizmann Institute of Science; 3. University of Haifa; 4. University of Paris-Saclay; 5. Tel Aviv University

The climate crisis is a major driver of the biodiversity crisis. Nevertheless, to-date the specific threats posed to biodiversity due to projected sea-level rise have not been addressed in a comprehensive manner. Here, we aimed to bridge this gap by exploring the expected habitat loss of land-vertebrates' distributions due to projected sea-level rise, under different emission scenarios. Specifically, we explored the effects of modeled sea level rise by the end of the 21st century, as well as by 2300, under two emission scenarios, RCPs 2.6 and 8.5. We then overlaid these modeled coastal maps with the distributions of all land vertebrates - over 30,000 species globally. Overall we found that under the higher emission scenario numerous species are projected to lose over 50% of their range, with some facing complete extinction. Species in regions that face the greatest risks include river deltas (e.g., the Ganges) and small Pacific and Caribbean islands (e.g., atolls). Overall, we highlight a currently neglected threat to species conservation policy and management - projected sea-level rise, and we hope that our insights will contribute to future conservation efforts and inform updates to The International Union for Conservation of Nature (IUCN) Red List criteria.



Trophic ecology of the invasive marbled crayfish in Israel

Rotem Mor¹, Oren Kolodny¹, Tamar Guy-Haim^{2,3}

Department of Ecology, Evolution and Behavior, The Alexander Silberman Institute of Life Sciences, The Hebrew University of Jerusalem, Jerusalem, Israel; 2. Israel Oceanographic and Limnological Research, Tel-Shikmona, Haifa, Israel; 3. Department of Life Sciences, Ben-Gurion University of the Negev, Beer Sheva

The marbled crayfish (*Procambarus virginalis*) is an invasive freshwater crustacean that over the last decades has established at hundreds of sites across Europe, North America, Africa, and recently also at several sites in Israel, raising concerns about its impact on fragile freshwater ecosystems. We tested the impact of *P. virginalis* on the food web at two invasion sites in Israel, combining stable isotope analysis ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$), with nutrition experiments in the lab. We collected crayfish at Za'anana pool and Mekorot pool in Beit Guvrin stream and at Ein Meshotetim spring near Haifa. We aimed to establish and compare their trophic position, isotopic niche width, and main food sources across different sites, seasons, and along the crayfish ontogeny. Preliminary analysis suggests that *P. virginalis* are omnivorous, consistent with findings from studies in other countries. Detritus was a main food source in the summer. An ontogenetic effect was found in Ein Meshotetim, where the isotopic niche width was relatively narrow. The continued spread of *P. virginalis* and other crayfish species in Israel poses a growing threat to its freshwater ecosystems. We hope this study will help to predict the effects on natural habitats and native species and will support conservation efforts.



Food fight: monosex prawns and crayfish as biocontrol agents against pest freshwater snails

Sharon Moscovitz¹, Shai A. Shaked¹, Ayal Green¹, Dmitry Portnikov², Haim Kalman², Eliahu D. Aflalo^{1,3}, Ariel Emanuel⁴, Hanoach Glassner⁴, Ofer Ovadia^{1,5}, Amir Sagi^{1,6}

1. Department of Life Sciences, Ben Gurion University of the Negev, Israel; 2. Department of Mechanical Engineering, Ben Gurion University of the Negev, Israel; 3. Department of Life Sciences, Achva Academic College, Israel; 4. Eden Research Farm, Emek HaMaayanot, Israel; 5. Goldman Sonnenfeldt School of Sustainability and Climate Change, Ben-Gurion University of the Negev, Israel; 6. National Institute for Biotechnology in the Negev, Ben Gurion University of the Negev, Israel

This study examines the effectiveness of non-GMO monosex decapods, the prawn *Macrobrachium rosenbergii*, and the crayfish *Cherax quadricarinatus*, as biocontrol agents against disease-transmitting freshwater snails that cause economic harm to fish farmers. In food-choice experiments, the decapods were introduced to four harmful snail species. Results showed significant predation preferences for physically and mechanically thinner and weaker-shelled snails for both predators, while harder-shelled snails were less preferred. The prawn exhibited selective prey preferences, while the crayfish exhibited opportunistic feeding behavior and was surprisingly more efficient in predation than the prawn. Following these results, physical and mechanical tests were conducted on the most and least preferred snails to quantify possible shell-related factors to the predators' preferences. Results showed that the least preferred snail had a significantly thicker shell, which required greater force to break than the most preferred snail. These findings suggest that the monosex decapods provide sustainable, non-invasive biocontrol solutions, potentially enhancing integrated pest management strategies in aquaculture when the specific biocontrol agent could be tailored according to aquacultural needs of the farmer and the local pest snail community, promoting a win-win-win situation for fish farmers when the biocontrol agent serves as both a valuable polyculture protein and promotes sustainable aquaculture.



Anthropogenic effects on charismatic species' distributions - the case of orchids in Israel

Tamar Birman¹, Enav Vidan², Jonathan Belmaker³, Uri Roll²

1. The Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev; 2. Mitrani Department of Desert Ecology, Ben-Gurion University of the Negev; 3. School of Zoology, Tel Aviv University

Mediterranean systems are high in plant diversity but are threatened due to habitat loss, especially in the eastern Mediterranean basin. Orchids are charismatic plants that can be particularly at-risk in Mediterranean systems due to high levels of endemism and habitat specialization. Here, we explored spatiotemporal trends of orchid species distributions in Israel during the past 40 years, and the overlap of past orchid observations with current land uses. Altogether, we analyzed 29 species with ~20,000 point-localities. To highlight spatiotemporal trends, we overlaid these localities on a 1 km² grid across Israel. We found that seven orchid species distributions have declined along the decades, four of which are designated locally endangered. Overall, we found that 22% of grid-cells that contained orchids in the past have been converted to anthropogenic environments, to some degree, by 2020. Of these cells about a third were fully converted and two-thirds only partially converted. Our results highlight that anthropogenic development has negatively affected orchids habitats and their distributions in the past few decades. Our work could promote dedicated conservation actions for this important group, and generally highlight the importance of acknowledging land-use conversion effects on rare and charismatic plant species.



Integrating philosophy of science and conservation biology in schools as part of a large ecological restoration project

Yafit Brenner¹, Guy Rotem¹, Yoram Tzvik², Simon Volin³, Yaron Ziv¹

1. Ben Gurion University of the Negev; 2. Douhifat Center for Ornithology and Ecology; 3. ROTEM, Israel Chemicals Ltd.

The Spatial Ecology Lab at Ben-Gurion University of the Negev studies the restoration of phosphate mines at the Zin-Oron site, which incorporates educational activities for biology major high school students. We teach them how to conduct scientific research based on principles of the philosophy of science and present them with restoration-oriented research questions through a three-day ecological workshop. Day 1 covers scientific thinking and philosophy, systems ecology and trophic interactions, and restoration ecology. The students then propose a research question, formulate hypotheses and make corresponding predictions. Day 2, a tour and field day, familiarizes them with geography, geology and biodiversity of the area, as well as the local fauna and flora. On this day the students experience data collecting, following their predefined hypotheses and predictions at the restored mining site. Day 3 brings students together to produce a final report, by summarizing the results, reviewing them and drawing conclusions through discussion and scientific reasoning. This workshop instills principles of scientific research and restoration ecology and fostering ecological orientation within those teenagers. Additionally, it consistently receives high evaluations from both students and teachers, demonstrating its success in meeting our key goals.



Biomass movement metric as an educational tool for the Anthropocene

Yuval Rosenberg¹, Dominik Wiedenhofer², Doris Virág², Gabriel Bar-Sella¹, Lior Greenspoon¹,
Barr Herrnstadt¹, Lewis Akenji³, Rob Phillips⁴, Ron Milo¹

1. Department of Plant and Environmental Sciences, Weizmann Institute of Science, Rehovot, Israel; 2. Institute of Social Ecology, BOKU University, Vienna, Austria; 3. Hot or Cool Institute, Berlin, Germany; 4. Division of Biology and Biological Engineering, California Institute of Technology, Pasadena, CA, USA

Earth is teeming with life on the move, shaping ecosystems and human civilizations alike. Mobility is also a daily and intuitive activity central to ecological dynamics and human impacts. However, students and the public lack a comprehensive understanding of the scale and composition of movement on Earth. Here, we introduce a biomass movement metric, a unique tool for educators and conservationists, and use diverse synthesizing methods to evaluate it across the biosphere. We show that the combined biomass movement of all wild land animals is ten times smaller than humans walking and cycling, and ~50 times smaller than all human biomass movement. This translates in terms of energy to a single power station generating as much power as is used today for locomotion by all remaining wild terrestrial mammals combined. The biomass movement of marine animals, which we find to be the living world's largest, has been halved since 1850 due to industrial fishing and whaling, while human biomass movement has increased 40-fold. This study gives a quantitative perspective on global mobility in the Anthropocene and corrects misconceptions regarding the extent of human versus animal activity. It could help mainstream human dominance over natural systems and motivate conservation action.



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Small and fragmented sites may be preferable for species' reintroduction: using a pop-gen perspective to inform reintroduction strategies

Dan Amichai, Yotam Ben Oren, Oren Kolodny

Dept. of Ecology, Evolution and Behavior, the Hebrew University of Jerusalem

The Wright-Fisher model is commonly used to predict allele frequency changes, emphasizing how smaller populations experience weakened natural selection and greater influence of random processes. This can lead to the fixation of slightly harmful alleles more easily. Similarly, the model can be applied to two species competing for the same ecological niche, where one is disadvantaged. In our study, we simulate conservation scenarios where a weaker species is the target for reintroduction, while the stronger species represents an invasive competitor. We used a spatially explicit, grid-based model to simulate population dynamics through time. Key processes include interspecies competition, breeding, migration, and reintroduction efforts. Our findings suggest that reintroductions should target smaller, isolated patches rather than larger areas or connected patches. This strategy takes advantage of reduced selective forces in smaller, isolated populations in favor of stochastic dynamics, making reintroduction efforts more likely to succeed. These results offer valuable insights for conservation, especially in environments where weaker species face competition from dominant ones.

Open woodland: detrimental or beneficial?

Daniel Idan¹, Niv DeMalach¹, Hila Segre²



1. Faculty of Agriculture, The Hebrew University Of Jerusalem; 2. Volcani Institute

Afforestation in Israel is a highly debated topic due to its potential impact on natural ecosystems. This study examines how sparse trees in open woodlands influence plant biodiversity and the role of specific tree species. We collected plant samples from beneath tree canopies, unshaded open patches within forests, and unplanted natural reference areas in the Lower Galilee. Results indicate that at the local scale (alpha diversity), *Ceratonia siliqua* and *Ziziphus spina* generally reduced biodiversity by up to 37%, while *Pistacia atlantica* was found to enhance biodiversity. Conversely, at the regional scale (gamma diversity), the number of species under tree canopies remained comparable to those in unshaded areas, and beta diversity increased, suggesting a beneficial structural diversity effect. Additionally, the presence of trees significantly altered plant composition; certain grass species thrived under canopies, whereas most legume species favored open patches, including several that are rare and endangered. In conclusion, open woodlands, composed of diverse native tree species, can enrich habitats and offer a sustainable forestry alternative. However, afforestation might change plant communities and risk specific species. Strategic analysis of beneficial tree species and maintaining open patches are crucial for ecological balance.



Non-stationarity in the impact of climate across mammal species ranges

Eduardo Arlé¹, Shahar Chaikin¹, Tiffany Knight², Jonathan Belmaker^{1,3}

1. George S. Wise Faculty of Life Sciences, School of Zoology, Tel Aviv University, Tel Aviv-Yafo, Israel; 2. German Centre for Integrative Biodiversity Research (iDiv), Halle-Jena-Leipzig, Leipzig, Germany; 3. The Steinhardt Museum of Natural History, Tel Aviv University, Tel Aviv, Israel

Environmental factors have been used to explain species' distributions for centuries. The relative importance of those environmental factors in determining species' occurrences may vary across space, being a non-stationary process. Furthermore, alternative measurements of the same variables, such as maximum, minimum, or mean values, may also have different strengths in explaining species' distributions. Thus, although species tend to thrive under their optimal conditions, the relative importance of extreme values of environmental variables is expected to be higher towards species' range edges. In order to quantify the contribution of individual variables across species' ranges, we employ SHapley Additive exPlanations (SHAP) to analyze the importance of climatic variables to individual occurrence points in Ecological Niche Models (ENMs) of 503 mammal species, verifying whether extremes versus means contribute differently to species suitability across the species range. Our preliminary findings indicate that minimum temperature tends to limit species ranges more than maximum temperature. Understanding the non-stationarity of variable contribution across species' ranges is a promising asset to range dynamics studies and species conservation.



Prioritizing conservation actions with climate change - the case of Israeli reptiles

Enav Vidan¹, Goni Barki^{2,3}, Jonathan Belmaker^{4,5}, Yoram Yom-Tov⁴, Uri Roll²

1. Ben Gurion University; 2. Mitrani Department of Desert Ecology, Swiss Institute for Dryland Environmental and Energy Research, The Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev, Midreshet Ben-Gurion 849900, Israel; 3. Albert Katz International School for Desert Studies, The Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev, Midreshet Ben-Gurion 849900, Israel; 4. School of Zoology, Tel Aviv University, Chaim Levanon 30, Tel Aviv 6997801, Israel; 5. The Steinhardt Museum of Natural History, Tel Aviv University, Klausner 12, Tel Aviv, Israel

Climate change is a major driver of biodiversity loss due to intensify in its harm in the coming decades. Consequently, it is paramount to also incorporate future climatic conditions when making conservation decisions. Here, we constructed systematic conservation plans for Israel's land reptiles comparing outputs based on species current distributions to Israeli reptiles' distributions based on future conditions. We initially collated, curated, and validated over 100,000 current observation records for 83 Israeli land reptiles. We then constructed species distribution models for these species with various environmental and current climatic conditions (using maximum entropy models). We further modelled the species' distributions with future climatic conditions under different emission scenarios. We then constructed formal systematic conservation plans to best protect Israel's reptiles within 30% of Israel's total land area (using the Prioritizr package in R). This was done both with species current modelled ranges and future ones under different scenarios. We found that future climate change affects the spatial distributions of conservation priorities for Israel's reptiles. Previously important reptile regions - ecotones and mountains reduce in importance with key species losses. Overall, our results highlight the importance of including future climate change effects on species when planning for conservation.



Burrow deep: how nest site selection protects desert chameleons from climate extremes

Liran Sagi, Amos Bouskila

Ben-Gurion University of the Negev

Reproductive success in reptiles is intricately linked to environmental conditions, making nest site selection by the females a critical adaptive behavior. While laboratory studies often focus on controlled incubation conditions, natural nesting strategies and conditions remain underexplored. The desert chameleon (*Chamaeleo chamaeleon musae*) serves as a case study for understanding how species adapt to extreme environments. Females dig extensive burrows, reaching depths of 1m, to create optimal conditions for their eggs, which require an 11-month incubation period. These chameleons use thermal cues to decide whether to abandon a nesting attempt and hydric cues to assess when they have reached the ideal depth, ensuring the survival of their offspring. These deep nests help buffer against extreme temperatures and moisture loss, potentially offering protection against the effects of climate change. Examining these behaviors provides insight into the significance of natural nesting strategies in mitigating environmental challenges, highlighting their importance in species resilience.



Mapping method and data source matters in conservation

Nicolas Dubos¹, Shai Meiri², Uri Roll¹

1. Ben Gurion University; 2. Tel Aviv University

Macroecological patterns are defined by the aggregation of species maps. Those maps can be drawn from multiple data types and varying sources. Both the type and source of the data can affect macroecological patterns and conservation decisions. Species maps are mostly represented with point, polygon or fitted data (from species distribution models, SDMs). We assessed the effect of data type and source on global macroecological patterns (richness maps, latitudinal richness gradients and species area relationships) and protection gaps for terrestrial tetrapods. We used point data from GBIF, polygons from the IUCN, and SDMs fitted from both sources/types. For reptiles, we were able to compare data types from a single source using GARD data, and compare the effect of data source for each data type. Preliminary results showed that point data (as well as fitted values from point data) underestimated the most richness patterns in the tropics, even when based on a single source. Spatial mismatches were less important in temperate climates. Protection gap analyses relying on point data might omit a significant proportion of species at low latitudes. Fitted data produced even stronger differences when based on differing type or source. We provide context-specific recommendations for the choice of mapping methods.



The effect of designated pastoral lands on mammal diversity in Mediterranean habitats

Ori Shapira^{1,2}, Dan Malkinson¹, Ido Izhaki¹, Shiri Zemach Shamir³

1. Haifa University; 2. INPA; 3. RUNI

Cattle grazing is one of the most common agricultural land uses worldwide that affects natural landscapes in multiple ways. Cattle domestication and pastoralism have been practiced in the Mediterranean region for more than two millennia. Therefore, it is expected that pastoralism in this area has a significant impact on wild mammalian communities. Our aim was to explore the effect of this long-term designated pastoral lands (DPL) over mammalian communities in an eastern Mediterranean ecosystem. We utilized a camera trap (CT) campaign to examine differences in species diversity, relative abundances, and species interactions in pastoral vs. non-pastoral lands, in concordance with distance from human settlements. We collected a total of 1450 CT events of 12 wild medium- to large-sized mammal species. Using Hill's numbers, we show a positive effect of pastoral lands on medium to large sized mammalian diversity as both species' richness and the effective number of dominant species were found to be higher on pastoral lands. Through GLLVMs we found that the relative abundance of most documented species is higher on pastoral lands than on non-pastoral lands, especially that of the eruptive golden jackal (*Canis aureus*). Finally, we show that pastoral lands affect species interactions, especially those of sympatric meso-carnivores.



**Ecological evaluation of agricultural landscapes within the Tkuma region, following the
Gaza war**

Rona Winter-Livneh, Eitan Romem

Open Landscape Institute (DESHE), The Steinhardt Museum of Natural History, Tel-Aviv University

Following the terrorist attack of October 7th and the immense damage caused to the western Negev by the Gaza war, the region is submitted to undergo significant restoration and development activities, particularly in construction and infrastructure. The strategic plans for this region, encompassing about 22% of Israel's agricultural lands, are led by a special management committee established by a government decision: 'Tkuma management committee'. In order to provide understanding of the contribution of the agricultural landscape to the ecosystem and establish priorities for sustainable conservation, we used GIS data to evaluate the ecological valence of these fields at various scales (national to local), using several spatial sub-indicators, such as ecological units, landscape continuity, floodplains, cover type, growth type and zoological observations. The analysis shows that agricultural areas with high ecological valence are primarily found in intensive field crop plots near major streams (Besor, Patish, Gerar). These areas are crucial due to their location within ecological corridors and proximity to nature reserves. The high ecological valence of these parcels makes them essential components of the region's open landscapes and ecosystems. This assessment is now being used as a key planning tool for the strategic development of the Tkuma region.



Eco-op: an information sharing network to promote cooperation between environmental organizations and ecologists in academia

Shahar Dubiner, Mai Lazarus, Michael Gomeh

School of Zoology, Tel Aviv University

The necessary cooperation between academia and nature conservation requires professional connections between people from all facets of conservation research and practice. Yet, many experience an accessibility and transparency issue, since project details are often not disclosed publicly. We developed an online information network: Eco-op (www.e-op.org), which aims to diminish gaps between conservation agencies and academics in Israel. This system provides access to past research, current projects and even future initiatives and important gaps in research. Access to the system is available to the various conservation bodies (governmental and non-governmental) and to students and researchers. This system can be navigated through search and filtering, and enables establishing contact at the early stages of projects, thus helping to promote them. In addition, this will make it easier for students and researchers to keep up to date with what is going on in conservation agencies, and thus adjust, adapt, and (hopefully) even plan their research to fit the required gaps. It also enables conservation agencies to navigate current research (including ongoing and unpublished research) when planning policy recommendations or decisions. We believe that, through increasing transparency and communicability, Eco-op can serve as a broad and shared scientific infrastructure for conservation in Israel.



**Impacts of invasive species control on plant functional traits and resource use in endemic
Scalesia forests of the Galápagos**

Tal Schabes

Hebrew University alumnus, visiting researcher at the Charles Darwin Foundation

Invasive species, such as the blackberry (*Rubus niveus*), threaten the endemic *Scalesia* forests of Santa Cruz Island in the Galápagos. Although previous research indicates that species diversity has remained unchanged post-invasion, community composition has shifted significantly. This study examined the differences in resource use and plant functional traits between managed (removal) and unmanaged (invaded) areas in the highlands of Santa Cruz, near the Los Gemelos volcanic sinkholes. The study's objective was to investigate how controlling species invasion impacts the structure and function of the *Scalesia* forest understory. Ten co-occurring species - encompassing endemic, native, and introduced plants - were studied in both the invaded and removal areas. Significant differences were found in leaf traits, including leaf length, leaf width, and specific leaf area, across the two sites. Of the resource use variables tested during the ten-week study, only soil moisture showed significant differences between the two sites. This research aims to improve the understanding of the dynamics within this unique and threatened ecosystem, contributing to long-term restoration efforts for the endangered *Scalesia* forests while enhancing invasive species management and ecosystem restoration strategies.



Drivers of introduction rate in marine alien species across taxa

Yonat Gefen, Yehezkel Buba, Jonathan Belmaker, Roi Holtzman

School of Zoology, George S. Wise Faculty of Life Sciences, Tel-Aviv University, Tel Aviv 6997801, Israel.

The emergence of new alien species is one of the main ecological concerns of the last century. As the documented numbers of newly introduced species keep increasing worldwide, reducing the rates of biological invasions has become a major global conservation aim. A primary indicator for evaluating invasion trends is the introduction rate, which is the change in the number of alien species in a region over time. However, the detection rates do not reflect introduction rates due to variations in sampling effort, preventing true qualification of numbers and impacts. To address this issue, we develop and test proxies for sampling effort time series and incorporate these into a model that produced less biased estimations of introduction trends. We apply the model over the number of new marine alien species in the Mediterranean across several major groups: fishes, mollusks and crustaceans. We find that while the raw detection rates of all three taxa show clear increases over time, correcting for sampling efforts revealed large variation in introduction rates among taxa. The approach also allowed us to compare the factors influencing the introduction rates for different taxa. Together, these sampling effort proxies can be widely applied to improve accuracy in alien species introduction rates estimations and thus better directing conservation efforts.

