

*"Understanding the secrets of nature will be our greatest endeavor."*

David Ben-Gurion,  
first Prime Minister of Israel



**Wildlife Responses to Desert Tourism**



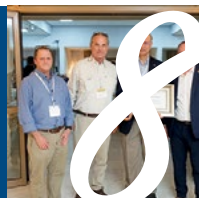
**Meet the Researcher**



**The 8<sup>th</sup> International Conference on DDD**



**Atmospheric-Water Capture by the World's Desert Soils**



**ZIWR's First International Water Summit**



Dear Reader,

I am pleased to present the latest issue of BIDR NEWS, the newsletter highlighting some of the accomplishments and activities of Ben-Gurion University's Jacob Blaustein Institutes for Desert Research (BIDR).

The primary scientific objective of the BIDR is to investigate the desertification process, as well as to pursue deep and innovative research into food security, water scarcity, renewable energy, and ecosystem dynamics. Our Albert Katz International School of Desert Studies (AKIS) offers four master's and PhD degrees, covering different areas of our expertise. AKIS brings together some of the most talented Israeli researchers with young scholars from developed and developing nations. These dynamic scientific interactions have woven a global fabric from which the next generation of academic researchers and decision makers will emerge. We are currently working on obtaining approval for a new international BSc degree at the BIDR, focusing on renewable natural resources.

Although our formal structure is based on three separate institutes, the BIDR is proud of the extensive inter-institutional collaborations it fosters between its various research groups. Many of our researchers, at the forefront of high-level research, are involved in national and international arid zone development projects. These local and global collaborations and connections reinforce my conviction that academics, particularly Israeli academics, cannot reside in an ivory tower but must partner with many different sectors to engage with the real world and its current challenges. In this issue of our newsletter, we shine a spotlight on two fascinating research projects, one focusing on the ecological impacts of desert tourism around water sources in our own Negev Desert, carried out in collaboration with the Israel Nature and Park Authority; and another one, examining non-rainfall water inputs, that will involve data from all over the globe.

We are also actively recruiting new researchers. With the primary objective of attracting outstanding researchers to bolster the BIDR's principal research groups, we are actively recruiting new faculty members. In this newsletter, we are pleased to introduce you to the newest additions to our academic staff: Dr. Tarin Paz-Kagan, Dr. Elad Levintal, and Dr. Victor Yashunsky.

In the fall of 2022, the BIDR hosted the Eighth International Conference on Drylands, Deserts, and Desertification (DDD). Held biennially at the BIDR, the DDD Conference brought together over 800 scientists, policymakers, and practitioners from almost 60 countries to promote sustainable dryland living. The DDD's continuing prominence and impact demonstrates the significant role played by the BIDR in the international scientific community. Earlier in 2022, we also hosted the first Zuckerberg International Water. The summit



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marked the first-ever bestowing of the prestigious Zuckerberg Water Prize to the 2022 Laureate, Professor Ashok Gadgil, who was chosen after a rigorous selection process. We look forward to both the 2024 DDD and the 2024 Water Summit, entitled "Innovative Solutions for Water Scarcity in a Changing World."

We are also happy to announce the inaugural bestowing of the Worms Prize, sponsored by the Worms Family, in memory of Gérard Worms, former Director of the French Associates of Ben-Gurion University of the Negev (BGU), which will take place at the BIDR on May 18. This prize will be given annually to excellent PhD students from Israel and France whose research focuses on desertification, water resources, and desert agriculture.

Finally, the BIDR is extremely happy and proud to play a key role in the 53rd Board of Governors Meeting of Ben-Gurion University of the Negev, which will take place from May 14–18, 2023. We extend a warm and heartfelt welcome to the Board of Governors and other esteemed guests! And we invite you to learn a little more about the BIDR in the following pages.

In partnership,

*Noam Weisbrod*

## The 2023 Worms Prize



We are happy to host the inaugural bestowing of the Worms Prize, sponsored by the Worms Family, in memory of Gérard Worms, former Director of the French Associates of Ben-Gurion University of the Negev (BGU). This prize will be given annually to excellent PhD students, enrolled at BGU's Jacob Blaustein Institutes for Desert Research (BIDR) or Écoles Doctorales and affiliated schools, universities, and research centers in France, who are pursuing research with the potential for significant impact in improved agricultural water management, arid soil protection, desertification mitigation and remediation, or overall agricultural improvements in arid environments. The establishment of the prize also aims to strengthen the connections between Israel-based and France-based researchers on topics of desertification, water resources, and desert agriculture.

The winners were selected from a pool of applicants by a scientific committee composed of Israeli and French researchers. The inaugural winners of the 2023 Worms Prize are Mr. Paul Vandôme, a PhD student at France's Institut Agro Montpellier-CIRAD, for his research project entitled "Mediterranean irrigated systems facing water resource constraints: multi-scale and multi-service evaluation of the adoption of new technologies," supervised by Prof. Gilles Belaud; and Ms. Klil Noy, a PhD student at BGU's BIDR, for her research project entitled "Spatiotemporal analysis of landscape pattern changes in sandy environments using machine learning algorithms based on satellite-derived big data," supervised by Profs. Arnon Karnieli and Yaron Ziv.

The prizes will be presented at a ceremony on May 18, 2023, at 11:00 am, at the BIDR, Building #9, Seminar Room, on BGU's Sde Boker Campus.





## Water as a Source of Human-Wildlife Conflict: Wildlife Responses to Desert Tourism Pressure Around Natural Water Sources

Prof. Oded Berger-Tal and Prof. David Saltz, of the Mitrani Department of Desert Ecology, Swiss Institute for Dryland Environmental and Energy Research, along with their PhD student Einat Zahabian, are examining the effects of desert tourism around water sources on local mammals and birds in the Negev Desert. In desert ecosystems, like the Negev, water is a critically limiting factor for both wildlife and humans, which can result in human-wildlife conflict. Even moderate tourist activities, such as hiking, can cause changes in wildlife's behavior and may directly impact their activity times, cause avoidance of important resources in natural habitats, and even create dependence on human food sources, such as trash. Using motion-activated camera traps, placed at 10 natural water sources with either high or low desert tourism levels, these researchers looked at the effects of direct human disturbance, such as their presence and the noise they create, on



*Einat Zahabian, a doctoral student at Ben-Gurion University's BIDR, led the study under the supervision of Prof. Oded Berger-Tal and Prof. David Saltz (Credit: Ben-Gurion University)*

wildlife. They found that high human disturbance reduced mammal and bird abundance at the water sources. Furthermore, next to the highly disturbed water sources, there was little overlap between the activity times of humans and mammals, with mammals arriving before or after the human activity hours. As a result, diurnal mammals at the disturbed sites shifted to more nocturnal activity, potentially exposing them to predation pressures.

To help reduce the conflict, the researchers placed artificial water sources at a distance of ~500 m from the high desert tourism water sources, hidden from human eyes, for six weeks. Preliminary

findings showed a pattern of wildlife preference for artificial water sources, where there is no tourism pressure on them. This may indicate that the animals' use of natural water sources that are under tourism pressure is not a result of habituation but a necessity for their survival.

This research has been undertaken in collaboration with the Israel Nature and Park Authority (INPA) to promote knowledge-based management and to promote co-existence between humans and wildlife around these unique desert environments.



*Wildlife caught on-field cameras installed by researchers at Ben-Gurion University in collaboration with the Nature and Parks Authority (Credit: Ben-Gurion University)*

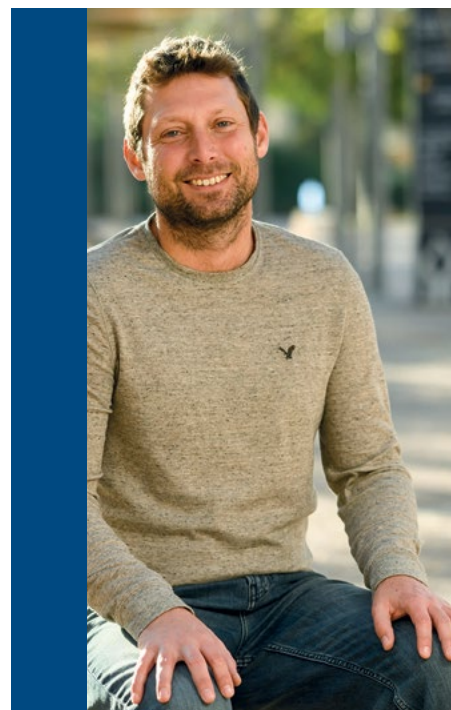
## Meet the Researcher



**Dr. Tarin Paz-Kagan** is a new researcher in the French Associates Institute for Agriculture and Biotechnology of Drylands. She was born and raised in Carmiel, Israel. After her army service and a stint as a park ranger for the Israel Nature and Parks Authority, she received her BSc in Biology and Environmental Studies from Tel-Hai Academic College. She then earned a master's degree from the Department of Geography and Environmental Development at BGU and a PhD in Remote Sensing and Landscape Ecology from BGU's Jacob Blaustein Institutes for Desert Research. She next held a postdoctoral position in Prof. Gregory Asner's lab in the Department of Global Ecology, Carnegie Institution for Science, Stanford University, USA. Before joining BGU as a faculty member, Dr. Paz-Kagan established

the Agro-Informatics and Remote Sensing Laboratory at the Institute of Agricultural Engineering, Agricultural Research Organization, Volcani Center, Israel.

Dr. Paz-Kagan is a remote-sensing scientist who uses computing and information technology to study soil-plant-environment processes and interactions. Her research focuses on identifying and quantifying spatial and temporal patterns in soil and plant responses and their interactions with biotic and abiotic stress. Dr. Paz-Kagan studies cross-scale processes to best understand complex phenomena from the individual plant level to the whole ecosystem. She and her colleagues use a combination of remote sensing data, advanced technologies, multiple sources of information, and the development of learning algorithms to identify connections and patterns that could not be found otherwise and to develop decision support systems for managing natural and agricultural systems more sustainably. Such studies are increasingly essential in drylands, where resources are limited, and extreme contrasts exist between natural and human-induced ecosystems. Dr. Paz-Kagan's research attempts to answer the question of how climate change and human activity will affect the degradation of natural and agricultural systems and how we can respond to these changes. Regarding the return of her and her family to the BIDR, Dr. Paz-Kagan notes that it feels like a wonderful homecoming.



**Dr. Elad Levintal** is a new researcher in the Zuckerberg Institute for Water Research (ZIWR). Dr. Levintal was born and grew up in Rishon LeZion, Israel. After his military service and various world travels, he returned to Israel to pursue his bachelor's degree in Environmental Sciences and Sociology & Anthropology at the Hebrew University.

He then completed his master's and doctoral degrees at BGU's Jacob Blaustein Institutes for Desert Research (BIDR) in the ZIWR, together with an additional master's degree in business administration at BGU's Marcus Family Campus in Beersheva. Next, he held a postdoctoral position at UC Davis in California, USA, where he focused on groundwater enrichment methods in agricultural regions. After spending nearly three





years in California, he returned to the ZIWR as a faculty member.

Dr. Levintal's research deals with environmental issues linking the soil and the atmosphere, especially the movement of water and greenhouse gases. He conducts field experiments at different sites across Israel and uses various sensors to obtain data in order to build better models and improve his understanding of different processes. For example, he examines how different wind speeds may affect the circulation of air in soil and the greenhouse gases emitted by abandoned wells. He also develops innovative systems for measuring environmental parameters, such as temperature and CO<sub>2</sub> levels, using open-source sensors.

He has a wide range of collaborators in this field, from laboratories in the US to high school robotics teams. Indeed, Dr. Levintal notes that collaboration is essential for good science, especially with regard to environmental issues where no single researcher can be an expert on all processes. He appreciates that the BIDR cultivates a sense of working together rather than as separate labs. On a personal level, he finds raising a family in Sde Boker to be a joyous and fulfilling experience.



**Dr. Victor Yashunsky** is a new researcher in the Swiss Institute for Dryland Environmental and Energy Research. He was born in Leningrad and made aliya to Israel in 1990, graduating from high school in Tel Aviv. He studied physics at the Hebrew University of Jerusalem, where he also obtained his PhD. Dr. Yashunsky's doctoral research focused on developing a method for characterizing layers of living cells. In his postdoctoral research, he studied freezing processes under Prof. Ido Braslavsky of the Hebrew University's Faculty of Agriculture. The next stop for Dr. Yashunsky was the Institut Curie in Paris, a leading global center in physical biology. There, he joined Prof. Pascal Silberzan and studied the laws of physics underlying the dynamics and organization of cell tissue. After returning to Israel, he worked as a senior researcher at Efa Technologies, developing a mobile apparatus for blood tests using a single drop of blood, without the need to forward them to laboratories.

Dr. Yashunsky is intrigued by the ability of cells to move in coordination and organize into structures. This coordinated movement of cells is very similar to the movements of flocks of birds or schools of fish. To understand the laws governing natural development processes, he is developing a system for monitoring and controlling the organization of cell populations using microscopy, computerized vision, micro-fabrication, and physical models. His research will ideally help us understand, as well as direct, the change and development of biological tissue. In the future, it will enable us to design and create artificial materials that behave like living tissue.

Dr. Yashunsky is grateful to join this institution, a place where physicists and researchers from a range of fields collaborate. He notes that this interaction with other disciplines is invigorating and opens new directions for research.

## The Eighth International Conference on Drylands, Deserts, and Desertification



*The Eighth International Drylands, Deserts, & Desertification Conference participants*

The Eighth International Conference on Drylands, Deserts, and Desertification (DDD) took place at BGU's Sde Boker Campus from November 27–December 1, 2022, with the BIDR's Prof. Shimon Rachmilevitch, from the French Associates Institute for Agriculture and Biotechnology of Drylands, serving as the conference chair.

As in past years, it was a great success, with over 800 participants and 250 speakers from nearly 60 countries. This year's theme, *Learning from Drylands: A Global Effort Towards Ecosystem Restoration*, concerned every living organism on our planet. The sessions focused on food, water, ecosystem restoration, ecology, energy, and societal and health challenges caused by desertification

and the means to combat them. The importance of the topics addressed by the DDD cannot be overstated. As Mr. Ibrahim Thiaw, the Executive Secretary of the UNCCD, noted in his opening remarks to the DDD, "Nearly 44 trillion dollars, roughly half of the world annual economic output, is being put at risk by the ongoing degradation. When land is plagued by degradation or drought, it not only loses its capacity to sustain life or sequester carbon, but it also contributes to water scarcity, habitat loss, crop failure, migration, and political conflicts." Prof. Rachmilevitch also explained that "as of today, almost 50% of the earth is defined as a dryland, and in not many years, 90% of the planet will suffer from various effects of desertification." However, the

news was not only dire. Mr. Thiaw also heralded a new collaboration between the UNCCD, the 11 African countries of the "Great Green Wall," and the Desertech community from Israel's Negev Desert—a project that will "bring together innovators, entrepreneurs, corporate entities, investors, policy makers, and non-governmental organizations to work to come up with innovative solutions, new technologies and new business models that can potentially create new green jobs, while contributing to the sustainable dryland management."

The schedule included 48 sessions, three roundtables of the Global Network of Dryland Research Institutes (GNDRI), eight tours, and one special panel discussion following the screening of the documentary *Dead Sea Guardians*. In addition, there were four keynote talks, including a talk on food security by BGU's Prof. Dorit Nitzan, entitled *Drylands Food Systems and Resilience* and one delivered by Prof. Osvaldo Sala, Arizona State University, entitled *Effects of Climate Change on Drylands: Directional Changes in Precipitation Amount and Variability*.

Fortunately, this year, the conference returned to its in-person format, but the organizers also provided opportunities to participate and attend remotely by offering ZOOM links for selected sessions.



## Atmospheric-Water Capture by the World's Desert Soils

Prof. Nurit Agam of the French Associates Institute for Agriculture and Biotechnology of Drylands and her colleague and former postdoc Dr. Dilia Kool have embarked on an exciting new research project focusing on atmospheric water flux into desert soils, resulting in non-rainfall water inputs (NRWIs). Taking the form of fog, dew, and water vapor adsorption, these NRWIs are an important source of water in arid areas. Considering the large surface area of arid and extremely arid regions (over 25% of the terrestrial surface area), NRWIs are a critical, albeit largely overlooked, component of the global hydrological cycle.

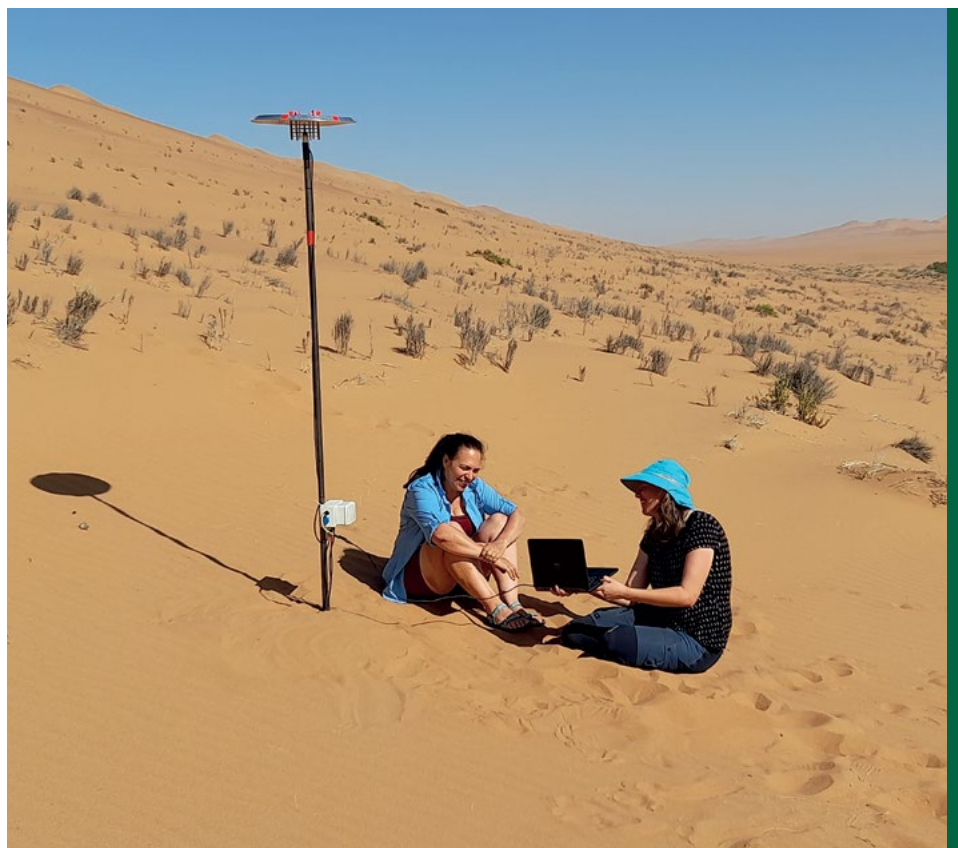
Thus far, quantification of NRWIs and how they affect water, energy, and CO<sub>2</sub> budgets has mostly been done at local scales. The little that is known about the global extent of NRWIs primarily concerns dew, the NRW component that contributes the smallest amount of moisture to soils in arid regions. Water vapor adsorption, on the other hand, is likely the most significant NRW, yet it is the least studied. Prof. Agam and Dr. Kool have proposed for the first time, to make a global assessment of water vapor adsorption by the world's desert soils and of the potential implications for soil-atmosphere CO<sub>2</sub> exchange.

To get a handle on the extent and magnitude of water vapor adsorption on a global scale, the researchers

are developing a potential water vapor adsorption index. They will then assess the actual water vapor adsorption relative to the potential at selected sites. Thus far, they have made measurements in the Negev Desert (Israel), in the Namib Sand Sea (Namibia), and in the Sahara Desert (Morocco). They have planned upcoming excursions to the Atacama Desert (Chile), the Western Desert (Australia), the Gobi Desert (China), and the Sonoran Desert (USA). Prof. Agam notes that this is, undoubtedly, the most exciting research that she has ever conducted. Stay tuned...



*With Dr. Eugene Marais, adventurer, scientist, troubleshooter*



*Atmospheric water capture by the world's desert soils, Prof. Nurit Agam and Dr. Dilia Kool*



## ZIWR's First International Water Summit



*Left to right: Profs. Amit Gross, Noam Weisbrod, Ashok Gadgil, Daniel Chamovitz*

On May 2022, the Zuckerberg Institute for Water Research (ZIWR) held the First International Water Summit at the Jacob Blaustein Institutes for Desert Research (BIDR)

on Ben-Gurion University of the Negev's (BGU) Sde Boker Campus. The summit brought together over 15 world-leading experts on applied and fundamental questions related

to the nexus of water, humanity, and the environment, with more than 230 participants.

The summit began with greetings from Mr. Isaac Herzog, President of the State of Israel, and its opening session was chaired by former Knesset member Prof. Alon Tal.

During the Gala Dinner on the evening of May 22, BGU President Prof. Daniel Chamovitz, BIDR, and Sde Boker Campus Director Prof. Noam Weisbrod, and ZIWR Director Prof. Amit Gross presented the inaugural Zuckerberg Water Prize to Prof. Ashok Gadgil, who holds the Distinguished Chair Professorship of Safe Water and Sanitation in the Civil and Environmental Engineering Department at the University of California, Berkeley.

## BIDR's Rural Water Development Course 2022

In the summer of 2022, as in past years, students enrolled in the BIDR's Rural Water Development course journeyed to Africa to implement a water improvement project, this time in Western Uganda.

The 2022 project was to construct a vegetable garden in an elementary school to improve the school children's daily nutritional intake. In the garden, the BIDR students installed low-pressure drip irrigation systems brought from Israel, which were connected to a water pipe several hundred meters away from the school.

