

From the Desert for the World

The Jacob Blaustein
Institutes for
Desert Research



BIDR
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Desert Research



אוניברסיטת בן-גוריון בנגב
Ben-Gurion University of the Negev



Drylands constitute more than 40 percent of the global land area and already hold more than 2.2 billion people. Environmental changes, such as global warming and further desertification of drylands, threaten 1.3 billion people in more than 100 countries.

From the Director



Dear Friends and Supporters,

David Ben-Gurion had a vision of making the desert bloom. Since 1974, the Jacob Blaustein Institutes for Desert Research (BIDR) have been partners in this mission.

Today, the Blaustein Institutes are international leaders in research related to the desert and the technologies required for sustainable development of drylands. The Institutes are developing strategies that address the most pressing concerns of the modern world: providing food, water, and energy in increasingly resource-scarce areas.

Our uniquely diverse multidisciplinary and interdisciplinary research and advanced teaching activities are carried out in laboratories, classes and other facilities on the Sede Boqer Campus of Ben-Gurion University of the Negev and in research stations and field sites scattered across the Negev Desert, as well as in various sites around the world. A team of about 70 scientists, 100 technical and administrative staff members, and more than 250 Israeli and international graduate students perform basic and applied research in the fields of water, energy, environmental physics, ecology, biotechnology, and agriculture.

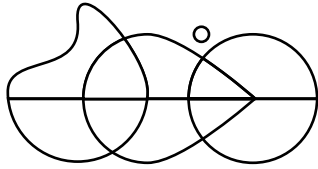
Drylands constitute more than 40 percent of the global land area and already hold more than 2.2 billion people. Environmental changes, such as global warming and further desertification of drylands, threaten 1.3 billion people in more than 100 countries. At this time of increasing population growth and resource scarcity, the Institutes' mission becomes even more critical.

In addition and in parallel to innovative research and technological development for a better future for our globe, I am proud of our efforts to build "human capacity" to tackle these challenges by teaching and training young scientists who will become tomorrow's leaders in this endeavor.

Thank you for joining us on this journey,

Noam Weisbrod

Prof. Noam Weisbrod



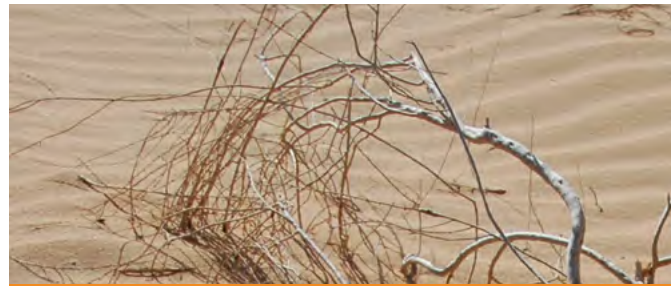
About the Jacob Blaustein Institutes for Desert Research

The Jacob Blaustein Institutes for Desert Research were established in 1974. Today, they are global leaders in research on desertification and sustainable development of the drylands. In addition, researchers and students investigate ways to meet global challenges related to food security, water scarcity, clean energy and more.

To address these challenges, researchers help to harness dryland ecosystems around the world for human habitation and survival with innovative science and cutting-edge technology.

The Blaustein Institutes are located at the Sede Boqer Campus of Ben-Gurion University of the Negev, in the heart of the Negev Desert, which covers some 60 percent of the land of Israel and represents the country's last open frontier for sustainable development. Our scientists dwell in the desert—in physical and intellectual interaction with their living laboratory.

Largely thanks to the research being done at the Blaustein Institutes, Israel is one of the few countries in which the desert is receding. The knowledge gained here is shared worldwide, where the rapid expansion of drylands, water scarcity, food security problems, and energy crises are affecting the lives of billions of people living in more than 100 countries.



Researchers and students investigate ways to meet global challenges related to food security, water scarcity and clean energy.



Three institutes constitute the Blaustein Institutes, each with its own mission and vision:

The French Associates Institute for Agriculture and Biotechnology of Drylands engages in cutting-edge basic and applied research to develop sustainable agricultural solutions in drylands to enhance global food production.

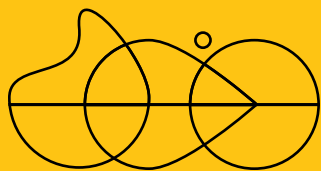
The Zuckerberg Institute for Water Research focuses on leveraging new technologies to provide drinking water and water for agricultural and industrial use and to promote the sustainable use of water resources, particularly in drylands.



The Swiss Institute for Dryland Environmental Research develops, implements and disseminates knowledge and technologies in the fields of clean energy, environmental physics, and basic and applied ecology.



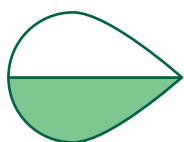
The Albert Katz International School for Desert Studies is the educational arm of the Blaustein Institutes, serving graduate students, who come from all over the world. **The Blaustein Center for Scientific Cooperation** also supports the Institutes and promotes exchange programs, postdoctoral training, workshops, conferences, and joint research programs with academic institutions worldwide.



Mission

Combating desertification and facing global challenges by bringing together water, food, energy, and environmental research.





The French Associates Institute for Agriculture and Biotechnology of Drylands

The global population increases every day by some 200,000 people. Experts project that by 2050, there will be 9 billion people in the world. The farmland needed to feed them lies in arid or semi-arid regions.

Plants growing in such areas are subject to harsh environmental conditions (such as drought and temperature extremes) that significantly reduce productivity. The problem is compounded by the increasing salinization of soils due to poor irrigation practices, global warming, and desertification.

At the French Associates Institute for Agriculture and Biotechnology of Drylands, our scientists collaborate to discover innovative approaches to farming, through the development of agrotechnologies and biotechnologies for increasing dryland food production while protecting the environment.

In the **Albert Katz Department of Dryland Biotechnologies**, researchers are developing new crops adapted to the various environmental stresses seen in the desert.



In addition, researchers support local fish farmers with consultative and diagnostic services, conduct research into the causes of disease in commercially raised fish, and develop ecologically benign plant-derived treatments for curing them. Scientists studying microalgae seek to maximize their potential to produce a variety of biochemicals for food, fuel, medicine and more.

In the **Wyler Department of Dryland Agriculture**, scientists conduct research on the different components of the soil-plant-atmosphere continuum, to enhance crop tolerance to stress, develop methods for sustainable crop production, and find new agricultural uses for inherently tolerant dryland plants. One group of researchers focuses on harvesting rainwater for drought mitigation, exploring new methods for capturing, managing and conserving rainwater for use in growing high-value crops and maintaining forests.



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Institute scientists are uncovering the secrets of seed germination and the dispersal of desert plants, and examining drought- and salt-tolerant plants for introduction into desert areas. Researchers are working to enhance agricultural productivity by developing innovative and efficient irrigation methods, while others are analyzing plants' natural responses to insect attacks to maximize productivity and reduce dependence on harmful pesticides.

Through their collective research efforts, Institute scientists are playing an important role in meeting and overcoming the challenge of food scarcity in the face of a growing global population.




The Zuckerberg Institute for Water Research

Water is one of the earth's most crucial resources, but it is finite.

To help meet the challenges of a growing population and a dwindling water supply, scientists at the Zuckerberg Institute for Water Research carry out interdisciplinary, cutting-edge research in water resource management, working to mitigate harm caused by human-made or natural events.

Institute scientists leverage new technologies to provide drinking water and water for agricultural and industrial use. As a national center of expertise and training on water issues, the Institute contributes to developing better policies for the sustainable use of water resources.



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Department of Desalination and Water Treatment

Through fundamental and applied research efforts, researchers in this department study all aspects of membrane technologies and desalination toward the creation of "new water resources." Their efforts include developing and improving new membranes, the design of water pretreatment procedures to prevent blockage, fouling and scaling of the delicate membranes used in reverse-osmosis desalination plants, and the treatment and/or reuse of the brines. The department also operates a semi-industrial pilot plant for desalination that serves as an experimental and educational center, which local industrial firms and municipalities can utilize to solve their wastewater treatment problems.

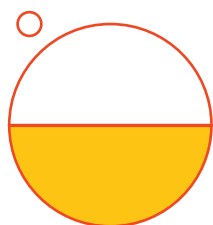


Department of Environmental Hydrology and Microbiology

The majority of the world's freshwater is used for irrigation, much of it contaminated with nutrients and other pollutants such as herbicides and pesticides. Consequently, beyond exploring the migration of various pollutants from the land surface to aquifers (vadose zone), studies in the department develop new low-tech and high-tech methods to treat, reuse and monitor marginal waters. Researchers in this department are also active in the optimization of artificial and natural recharge processes and the remediation of polluted groundwater, as well as in projects of interest to dryland industrial production and waste amelioration.

Institute scientists have developed remedial steps that have diminished the pollution of a major aquifer beneath a large industrial park located in the Negev Desert. Joint studies between Israel, including the Institute, and both Jordan and the Palestinian Authority on surface runoff and aquifer recharge are expected to advance the cooperative management and sustainable use of shared water resources.





The Swiss Institute for Dryland Environmental and Energy Research

The effects of desertification are experienced locally, nationally, regionally and globally. The Swiss Institute for Dryland Environmental and Energy Research fosters integrated, interdisciplinary approaches to the study of the environment in the drylands of Israel and the world.

The Institute is developing, implementing and disseminating knowledge and environmental technologies in the fields of solar energy, environmental physics and ecology. The Institute also endeavors to improve human well-being in natural and human-made environments in drylands by promoting biological conservation and the use of sustainable energy resources.



Marco and Louise Mitrani **Department for Desert Ecology**

The department uses deserts as model ecosystems for advancing ecological knowledge, conservation and the sustainable development of desert regions. Combining observational, experimental and mathematical approaches to tackle basic scientific questions, researchers strive to answer questions that have implications for the informed management of the desert environment and its inhabitants. Specific studies in the department address basic ecology questions and issues in conservation biology. Basic ecology research focuses on evolutionary ecology at all levels (population, communities, and ecosystems), behavioral ecology, physiological ecology, and microbial ecology. Conservation studies focus on the dynamics of endangered populations, animal disease and parasitology, conservation genetics, plant-animal interactions, and conservation behavior.

Alexandre Yersin **Department of Solar Energy and Environmental Physics**

This department seeks to apply tools from mathematics, physics, chemistry and engineering to a wide range of problems relevant to the study of the environment, and specifically, that of drylands. In pursuit of this goal, its scientists conduct state-of-the-art research in solar energy, climate dynamics, vegetation dynamics and pattern formation, the physics of water desalination and more. The department consists of two groups:



41% of the earth's landmass is drylands, and is home to more than 2 billion people.



One group specializes in physics and the environment. Researchers apply mathematics, physics and chemistry to characterize natural processes and climatic phenomena.

The second group of researchers, at the Ben-Gurion National Solar Energy Center, focuses on material science and solar energy, specifically examining the use of solar energy as an alternative energy source using different technologies, ranging from electricity generation by solar cells, to energy storage by batteries, and water splitting to produce hydrogen fuel. These scientists aim to reduce dependence on fossil fuels while developing new sources of clean energy.

Albert Katz International School for Desert Studies



At the Albert Katz International School for Desert Studies, the educational arm of the Blaustein Institutes, professors help budding young scientists dig deeper, reach higher, and achieve their goals.

Students can enroll in either a multidisciplinary master's degree or a Ph.D. program in desert studies that combines basic and applied research.

Master's Degree Program Options:

Desert Studies, specializing in one of the following areas

- Agriculture and Biotechnology of Drylands
- Solar Energy and Environmental Physics
- Irrigation and Plant Environment
- Environmental and Aquatic Microbiology

Hydrology and Water Quality, specializing in one of the following areas

- Water Resources
- Desalination and Water Treatment
- Environmental Microbiology and Water Quality

Ecology, Conservation and Management, specializing in one of the following areas

- Evolutionary Ecology
- Nature Conservation and Management

A Ph.D. program in Desert Studies can be completed within the framework of the Kreitman School for Advanced Studies of Ben-Gurion University of the Negev.

The Albert Katz School was founded in 1998. All courses are taught in English. It currently has 250 students from 20 countries, and 700 alumni from 45 countries.




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The Jacob Blaustein Center for Scientific Cooperation

The collaborative scientific activities of the Blaustein Institutes are coordinated through the Blaustein Center for Scientific Cooperation. The center promotes and finances exchange programs, postdoctoral training, workshops, and joint research programs with other academic institutions all over the world.



Ben-Gurion University of the Negev (BGU) is the fastest growing research university in Israel. With 20,000 students, 4,000 staff and faculty members, and three campuses in Beer-Sheva, Sede Boqer and Eilat, BGU is an agent of change, fulfilling the vision of David Ben-Gurion, who envisaged the future of Israel emerging from the Negev.

Today, BGU's mission continues to effect change, locally, regionally and internationally. With five faculties and several world-renowned research institutes, BGU is a recognized national and global leader in many fields, actively encouraging multidisciplinary collaborations with government and industry, and nurturing entrepreneurship and innovation in all its forms.



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