VOICE FROM THE DESERT

NEWSLETTER OF THE JACOB BLAUSTEIN INSTITUTES FOR DESERT RESEARCH
המכונים לחקר המדבר ע"ש יעקב בלאושטיין

SPRING 2014

JACOB BLAUSTEIN INSTITUTES FOR DESERT RESEARCH

Director's Message

Dear Reader,
I am pleased to present you with the new issue of VOICE from the DESERT, the newsletter featuring the accomplishments and endeavors of the Jacob Blaustein Institutes for Desert Research (BIDR).

The current issue features the work of BIDR researchers around the globe. As our Institutes strive to raise our international profile and increase our overseas collaborations, we are happy to take a moment to present a scientific "travelogue," giving the reader snapshots of the exciting projects our researchers are carrying out in far flung locations, such as Namibia, Thailand, and the Galapagos Islands, just to name a few. We wish to emphasize the reciprocal benefits of these projects. While we are certain that our researchers enjoy the fascinating places they visit and gain vital scientific knowledge from their research projects, they are simultaneously assisting the local population—both through direct action, such as building rain catchments for clean drinking water, and through training local people in methods of food production, irrigation, conservation, agribusiness, and more. The researchers featured in these pages report an inspiring number of their local collaborators who have subsequently come to do their graduate studies at the BIDR's Albert Katz International School for Desert Studies (AKIS), highlighting the indispensable role of training and education in the struggle to provide resources to the people around the world facing desertification and land degradation.

In keeping with this, the Institutes will host, for the fifth time, the International Conference on Drylands, Deserts and Desertification, taking place November 17-20, 2014 on our campus. As in past years, the conference is being held in collaboration with UNESCO, the UNCCD and Israel's Ministry of Foreign Affairs. This year, the overall theme is "Healthy Lands-Healthy People," and we expect that, as in the previous four gatherings, the conference will offer a variety of compelling and significant presentations, discussions, field trips and workshops, and will attract participants from nearly 60 countries around the globe.

Finally, we are excited to announce that phase 1 of the construction of the new dorms on campus has been completed, and the units are now housing our graduate students. Phase 2 units are scheduled to be occupied by May, and phase 3 units by October for the start of the new academic year. These residences are vital to a large number of our students who do experimental work for long hours on the campus, making commuting difficult. Additionally, the dorms provide our international students with a comfortable and conveniently located home away from home. AKIS's residential campus creates a close sense of community, with a unique learning environment for students and faculty alike.

Without further ado, I welcome you to open the pages of this newsletter and join our researchers in their groundbreaking work around the world.

Yours in friendship
Prof. Pedro Berliner

Tending the Herd - Diversifying livestock among the Borana in southern Ethiopia

Change is hard for everyone. For generations, the Borana, nomadic pastoral people in southern Ethiopia, have raised cattle.

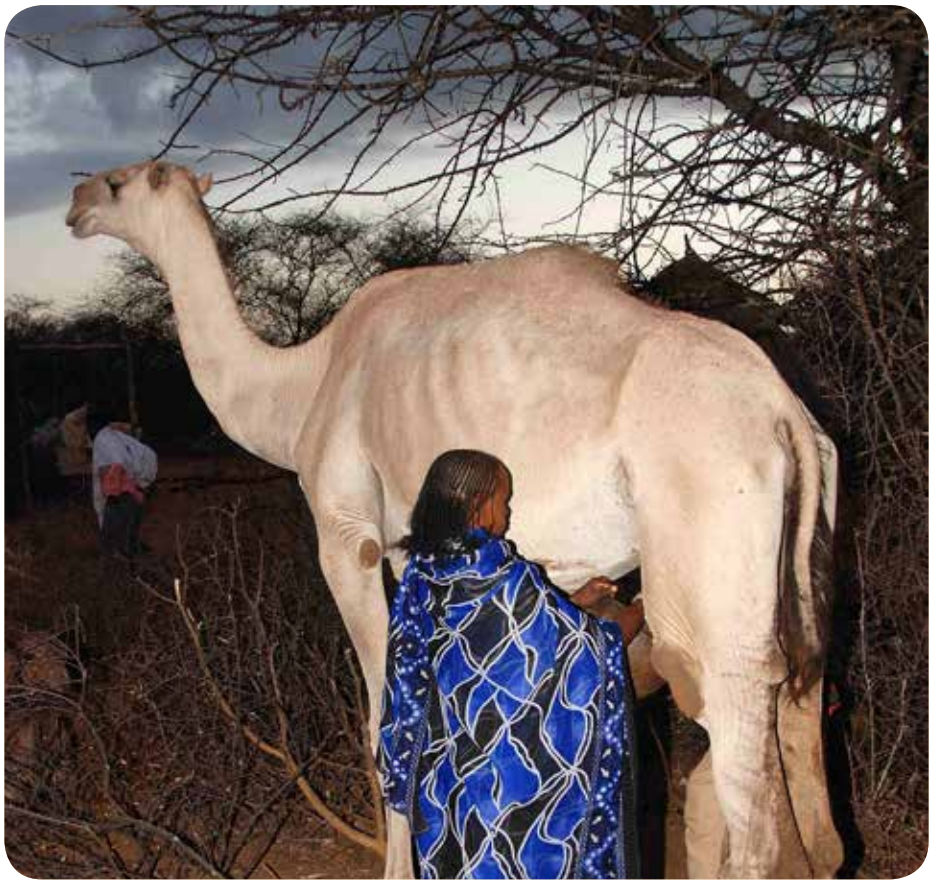
But now, due to a combination of factors, including recurring droughts that decimate the cattle herds, government policy pressure to turn rangeland into farmland, and the purchase of large tracts of land by private investors, they are being forced to change their traditional way of life.

Prof. Allan Degen of the BIDR's French Associates Institute for Agriculture and Biotechnology of Drylands, Wyler Department of Dryland Agriculture, is doing his part to help ease this transition.

As a specialist in desert animal adaptations and husbandry, he has been studying livestock production among the Borana and has reported on the benefits of shifting from strictly cattle to include more drought-tolerant livestock, such as camels, sheep and goats.

Simultaneously, the Borana have responded to the government's push to get them to settle in one place and the loss of their traditional grazing lands by beginning to grow crops for home consumption and for cash.

As Prof. Degen notes, initially "this was very frowned upon by the Borana" since they consider themselves "cattle people." Proving that change is possible, however, today, nearly all of the Borana are cultivating land in small plots. Initially invited to southern Ethiopia by the NGO Save the Children, Prof. Degen, along with the BIDR's Dr. Moshe Schwartz and Dr. Michael Kam, assists the Borana in



learning how to raise their new flocks, how to keep their animals healthy, and generally ensuring that they can maintain a partially pastoral livelihood, albeit with camels, goats and sheep added into their livestock production.

While Prof. Degen admits that the elders, perhaps in the manner of elders everywhere, still have not accepted these new changes of land cultivation and non-cattle herd animals, he notes that the younger people are starting to study agricultural techniques and animal production, coming to terms with their new reality.

In fact, the ex-manager of Save the Children in Negelle Borana, the main town of the region, came to AKIS and completed his master's degree last year, focusing on this very project for his thesis.

As with nomadic pastoral people around the world, the future of the Borana's traditional lifestyle is uncertain.

However, Prof. Degen and his colleagues are helping to train the next generation to adapt to the changes at hand.

Building Bonds of Scientific Cooperation - Establishing a sister university in Botswana

Most people agree that Africa will be at the center of future human needs resulting from increasing climate change and desertification.

With their wide-ranging expertise in desert studies, the researchers of the BIDR have been and will continue to be involved in helping to solve these pressing problems, as well as in collaborating with and mentoring fellow researchers in Africa.

In seeking to meet these goals, two challenges present themselves: 1. how can BIDR researchers and students carry out the necessary long-term field studies in Africa, when grant-funded projects typically only last a year or two?, and 2. how can the BIDR reach out to students in Africa to help train local experts? Prof. Pedro Berliner, Director of the BIDR and a member of the French Associates Institute for Agriculture and Biotechnology of Drylands, Wyler Department of Dryland Agriculture, hopes to address these challenges and provide further opportunities through serving as a member of the council of the newly established Botswana International University of Science and Technology (BIUST).

Open only since 2012, this new university aims for an enrollment goal of 1500 undergraduate and graduate students. Researchers from the BIDR will be directly involved in the soon-to-open multidisciplinary institute for graduate studies, specifically in their Department of Natural Resource Management. The idea is that BIDR faculty will lead “split-study” courses on topics such as dryland agriculture and water management.

Attended by both BIUST and BIDR students, the course work will take place in Sede Boqer and the research projects will be carried out in Botswana. This will, as Prof. Berliner puts it, “create a platform for an international research program. It will allow long-term BIDR research activity in Africa, as well as the training of the local population.”

Through building research knowledge and human capital, the problems of Africa, as the bellwether of global climate change and desertification, can be faced and, hopefully, solved.

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Days of Wine and Water - Assisting winemakers in Italy

What could Italian winemakers, steeped in generations of tradition, possibly have to learn from a desert-dwelling scientist from Israel about growing wine grapes? If that desert-dweller is Dr. Aaron Fait from the BIDR's French Associates Institute for Agriculture & Biotechnology of Drylands, Albert Katz Department of Dryland Biotechnologies, the answer may indeed be "a lot."

Specifically, Dr. Fait has just embarked upon a research project with the University of Udine in Italy to help them learn how to irrigate their vines.

Udine, located in northern Italy, has been experiencing serious periodic droughts in recent years. It is against European winemaking tradition to irrigate vines since the wine is supposed to be the natural result of the interaction between plant and environment. (Fun fact: until 2006, it was illegal in France to water the vines of wine grapes! How would you like to do hard time for watering your plants?).

However, years of drought have forced a change in thinking since the vineyards around northern Italy have begun to lose 30% of their harvest. So they have turned to Dr. Fait and his colleague Dr. Naftali Lazarovitch who, with a joint Israel-Italy grant, will assist them in learning the practices of irrigating wine grapes without altering the unique quality of these regional wines.

Dr. Fait, together with Dr. Lazarovitch and Dr. Shimon Rachmilevitch, has carried out several projects focusing on grapevine irrigation in the arid Negev plateau, to aid local wineries in gaining higher quality produce. Israel's vineyards, in their current iteration, are young, but the Negev Desert, indeed, holds a long history of winemaking. As we know from the enormous wine presses found at the ancient Nabatean city of Shivta, these first century traders made wine in the desert and they made it for export. Dr. Fait will bring the knowledge of these practices, along with his background as a plant biochemist, with him to assist the admittedly "terrified" Italian winemakers begin an irrigation program.

As Dr. Fait says, "wine is about chemistry. Its quality is defined by chemical properties," which are affected by such things as water and climate. He also notes that wine, in addition to possessing proven health benefits and serving as an enormous economic driver, is also a "part of society, culture, religion and human heritage."

As the storied wine growing regions of the world begin to experience climate change, the desert winemaking knowledge of Dr. Fait and others will become increasingly in demand. Something to think about as you raise your next glass of vino!

Prickly but Delicious - Cultivating beles in Ethiopia

What is more Israeli than the "sabra"—the spiny cactus with the sweet fruit, also known by its scientific name Opuntia ficus-indica and throughout other parts of the world by the catchy moniker "prickly pear"? In fact, this nutritious and delicious plant is not specific to Israel at all, but is found in arid lands all over the globe, including Ethiopia where it is known as beles.

Indeed, in April 2013, Prof. Avi Golan, of the BIDR's French Associates Institute for Agriculture and Biotechnology of Drylands, Albert Katz Department of Dryland Biotechnologies and Mr. Yoseph T. Delelegn, a young Ethiopian scientist, carried out a feasibility study, on behalf of the United Nations Industrial Development Organization (UNIDO), to examine whether beles might be a good crop for agribusiness in the Tigray Region of northern Ethiopia.

Along with his partner, Prof. Golan set out to determine if this juicy fruit, with proven nutritional and medicinal values, could be cultivated for export to Europe, Turkey, Saudi Arabia and other countries, benefitting both the consumer and the impoverished Ethiopian farmers who grow this crop.

As a plant biochemist and a specialist on desert plants, in particular, Prof. Golan brought his expertise, honed in the Negev Desert, to this important project. Currently, much of the beles harvest is lost due to the lack of developed industrial processing and transport methods. Local women and children plant, cultivate and harvest the crop, mostly to simply sell it along nearby road sides.

After working closely with Ethiopian government officials and fellow scientists from the Helvetas Swiss Inter-corporation, the Tigray Region Agricultural Marketing Promotion Agency, Mekelle University and Adigrat University, Prof. Golan's study determined that with more investment in infrastructure, this fruit can indeed be cultivated for export to foreign markets, with enormous economic benefits for these female and youth farmers.

The study also discussed ways, through scientist-farmer support groups, to develop scientific methods so that the crop can be grown in the cold winter months, when it will fetch very high prices in the European market.

As Prof. Golan points out, beyond just economic benefits, these cooperative efforts will also enable the local farmers to feel a sense of ownership over their efforts.

As he says, "we tried to motivate very poor people to be involved and to create some kind of cooperation between scientists and the local farmers to give them a wider scope than just picking the fruit in the morning and going and standing on the road and selling it."

Based on Prof. Golan's study, UNIDO decided to fund more extensive research into this endeavor, which will hopefully "bear fruit." As Prof. Golan puts it, BIDR researchers have much to offer to and receive from the people of this region because "we have so much in common," including the environmental conditions under which we live and the desert fruits that we eat.

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Fields of Plenty - Maximizing the benefits of water resources in rural Zambia

The village of Simango in Zambia is, like many parts of Africa, rich in natural resources, particularly in clean, high quality groundwater. Yet, due to the costs involved in accessing this water, the population often still draws unclean water from nearby ponds for drinking and only cultivates small home gardens with produce for family consumption.

AKIS Ph.D. student Adam Abramson, supervised by Dr. Naftali Lazarovitch, Prof. Eilon Adar, and Prof. Alon Tal, recently undertook a project to examine, in part, whether the cost of accessing clean water could be reduced, while the benefit of this water could be increased, specifically by using the water to irrigate crops that could then be sold for cash.

As in much of rural Africa, the most common water source in Simango has traditionally been hand-powered pumps, the least expensive option. The groundwater they access using these pumps is of good quality, but the hand pump only allows enough water for limited domestic use.

Funded by the Grace and Hope Charitable Trust, the BIDR project proposed to introduce more efficient pumping methods, using electricity, and to offset the cost to the villagers by also using the water, via the sophisticated high-water-use-efficiency method of drip irrigation, to grow the lucrative crops of tomatoes and zucchini for sale to city dwellers an hour's drive away.

Abramson's team also tested innovative methods of alternate financing, by allowing the villagers to pay for their water through working in the community gardens, rather than using cash. As part of this project, Abramson developed an Excel®-based computer program, dubbed the AWARE Decision Support System, that compares all possible water improvement options for any given rural community and finds the optimal solution, given certain objectives.

Abramson wrote his dissertation on this topic, and now, after completing his Ph.D., is about to begin post-doctoral work at the University of California, San Diego with fieldwork in rural Zimbabwe.

Additionally, the on-site Zambian agronomist, Miyanda Moombe, who worked on this project, came to the AKIS, and he is now completing his master's degree under the supervision of Lazarovitch, proving that both tomatoes and scholars can grow in the fertile fields of Zambia.

Paradise Saved - Conserving biodiversity in the Galapagos Islands

By every measure, the Galapagos Islands, belonging to Ecuador yet lying 1000 kilometers west of the South American coast, are a tropical island paradise, due, in no small part, to the stunning variety of plants and animals found there.

Indeed, some of the central principles of Charles Darwin's Theory of Evolution were inspired by his visit to these islands.

Yet now they are in danger of being "loved to death," as growing tourism threatens the very biodiversity that makes them unique.

However, Prof. Ariel Novoplansky of BIDR's Swiss Institute for Dryland Environmental and Energy Research, Mitrani Department of Desert Ecology, is doing his level best to help prevent these islands from going the way of the Hawaiian and Canary Islands, with their degraded ecological systems.

In 2013, Prof. Novoplansky led a delegation from Israel, including the BIDR's Prof. Uriel Safriel and Prof. Noam Weisbrod, the Agricultural Research Organization's Dr. Alon Ben-Gal and Hebrew University's Prof. Aliza Fleischer, to the Islands and signed a cooperation agreement with the Directorate of the Galapagos National Park to promote the conservation of the islands' biodiversity.

Even though 97% of the islands' area lies within a national park, the growing avalanche of tourism, with its accompanying need for imports, has introduced a variety of invasive species that are threatening the native flora and fauna.

Prof. Novoplansky and his colleagues have proposed an unorthodox method to address this problem—agriculture. While he admits that "agriculture in the service of conservation" sounds counterintuitive, Novoplansky explains that, in fact, by "carefully crafting agricultural practices that will allow increased local agricultural production in the archipelago and by utilizing already heavily-disturbed abandoned farmlands, we can limit the migration and prevent the destructive effects of invasive species on the Galapagos unique ecosystems."

In collaboration with the Ecuadorian government, they plan to carry out a data analysis and a pilot project, to determine which crops to grow and the best methods by which to cultivate them.

If the current deterioration of the islands' biodiversity is halted, future generations will have the opportunity to be as awestruck as Charles Darwin was when visiting the Galapagos Islands.

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Home, Sweet Home - Investigating animal burrows in Namibia

Humans are not the only species who design their living quarters. While they may be the only ones to select curtains, various animals, ranging in size from ants to aardvarks, construct complex burrows in which to live.

Professor Berry Pinshow, of the BIDR's Swiss Institute for Dryland Environmental and Energy Research, Mitrani Department of Desert Ecology, investigates the different ways that these animals construct burrow structures to meet their needs—to avoid being eaten by other animals, to find protection from adverse environmental conditions, to raise their babies, and to hoard food. For example, scorpion (*Scorpio maurus*) burrows all have the same characteristic basic shape.

As Prof. Pinshow puts it, "The scorpions' burrow has evolved through natural selection on the species that builds it.

What is it about this design that is good for the scorpion?" Why do animals of all sorts construct burrows in the ways that they do?

These questions took Prof. Pinshow to Namibia. While doing groundbreaking research on how animals construct burrows to use wind energy, Prof. Pinshow formed a collaborative relationship with J. Scott Turner, Professor of Biology at the State University of New York, who has done cutting-edge work on termite mounds in southern Africa.

In the beautiful and pristine land of Namibia's Cheetah Conservation Fund, Pinshow and Turner, with the assistance of many local people, have studied the burrows of Cape skinks and the nests of ants, using techniques such as casting nests in aluminum, to investigate ventilation.

Pinshow and Turner also realized that they agreed that it was somewhat "neocolonial" to simply travel to a place, gather data, and take it home without leaving anything behind.

Thus, Pinshow and Turner are preparing an online course on the Principles of Measurement in Biophysical Ecology, along with Eugene Marais, Curator of the National Museum of Namibia. The goal of this course is, as Prof. Pinshow puts it, "to use a variety of digital tools to promote a 'bottom up' establishment of online scientific cultures in Namibia."

He believes that "learning is enhanced when learners are given ownership of educational content that is drawn from their own experience and environment."

While Prof. Pinshow, a native South African, admits that part of the reason he loves working in Namibia is that there he can "smell the smells of Africa at sunrise," he also hopes to leave a lasting contribution to the people who live there.

Connecting Science and Public Policy - Former BIDR Director chairs key UNCCD committee

Prof. Uriel N. Safriel, former BIDR Director (1995-2001) and currently Israel's Focal Point to the United Nations Convention to Combat Desertification (UNCCD), was elected in September 2013 by the UNCCD's 11th Conference of the Parties (COP), comprised of 194 parties that convened in Windhoek, Namibia, to chair the Committee on Science and Technology (CST).

Developed as a result of the 1992 Rio Summit, the UNCCD has brought attention to the phenomenon of land degradation called "desertification" when it occurs in drylands, the most vulnerable ecosystems with the most vulnerable inhabitants in the world.

The CST provides information and advice on scientific and technological matters relating to combating desertification and mitigating the effects of drought to the COP.

In addition, Prof. Safriel is serving as the co-chair of the Science-Policy Interface (SPI) committee, which will include ten independent scientists, not appointed by governments, who will, as Safriel explains, "receive charges from the CST" regarding the lack of knowledge required for implementing the Convention and "will search for mechanisms that could perform the assignment."

After the SPI identifies the mechanisms to address the issue, "the function of the SPI is to translate the scientific mechanisms into the language of policy makers" so that it can bring them to the COP for consideration.

Last year, Prof. Safriel was also involved in another project of an important network in the study of desertification, specifically the Global Network of Drylands Research Institutions (GNDRI).

This association, of which the BIDR is a member, organized its inaugural international course titled "Integrated Assessment of Drylands: Environmental and Human Approaches," co-funded and organized by the BIDR and IADIZA, CCT CONICET in the Mendoza region of Argentina.

In October 2013, Prof. Safriel traveled to Mendoza to give four lectures in this course.

Through all of the above projects, Prof. Safriel is working at the forefront of building networks and bringing scientific knowledge into policy making in order to develop the drylands sustainably.

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Food for the Future - Producing Spirulina in Thailand

"Dude, can I get a Spirulina smoothie?" This is something you might hear if you find yourself in the beach towns of Southern California. But at the Microalgal Biotechnology Laboratory of which Prof. Avigad Vonshak, of the BIDR's French Associates Institute for Agriculture and Biotechnology of Drylands, Albert Katz Department of Dryland Biotechnologies, is a member, this blue-green alga is known to be much more than a trendy supplement to the refreshing drinks of affluent Californians.

Indeed, thanks to the work of Prof. Vonshak and others, Spirulina has become a protein-rich food source for both humans and animals in the impoverished areas of the developing world. In addition to being highly nutritious, Spirulina cultivation does not require the large amounts of arable land and fresh water that more conventional crops do, thus benefitting both the humans and animals who consume it and the surrounding environment.

Thirty years ago, Prof. Vonshak, with the cooperation of USAID, traveled to Thailand to explore the possibilities of producing Spirulina as a source of protein for aquaculture in the country, with the hopes of increasing the production of fish, a popular food in Thailand, and diversifying the sources of income for the Thai farmers who were overly dependent on rice production.

With the cooperation of the Thai government's National Institute for Inland Fisheries and many local people, the project was a success. Over the course of thirty years, Prof. Vonshak has been involved in various Spirulina projects in Thailand. In all these projects, Prof. Vonshak has worked with the Thai government, Thai universities, especially the King Mongkut's University of Technology Thonburi, and local farmers. To what does Prof. Vonshak attribute the success of this long-lived collaboration between an Israeli scientist and his Thai partners? He gives much credit to the Thai government for investing strongly in higher education.

Equally important is the success that he and his Thai peers have had in what he calls, "building human capacity." He argues that this training of local people is a necessary component for scientists doing work in the developing world so that "once you disappear, the know-how is not gone; it doesn't disappear with you." Due to these efforts, the people of Thailand join the Californians in benefitting from this "miracle food."

Catching the Rain in Africa - AKIS students working in Uganda

Last year, for the fifth time, Prof. Noam Weisbrod and ten students from his *Rural Water Development* course traveled to Africa to put their theory into practice. While students in previous courses implemented water solutions in Ethiopia and different regions in Zambia, 2013 marked the first trip to Uganda. In partnership with the NGO The Water Trust, they went to work in the Masindi region of western Uganda.

Their first project was to construct a rain catchment system in a rural school of 2000 children. Previously, the children had to fetch their drinking water with containers from a spring, a mile away, going back and forth many times a day. Prof. Weisbrod's students installed gutters and built a large tank, about 2 cubic meters, to catch rainwater running off from the gutters to have fresh drinking water at hand. As Prof. Weisbrod puts it, "Rainwater is typically better quality than any other water you can drink, including mineral water that you buy. Compared to what the children were drinking before, this rainwater is cleaner than double-distilled water."

Weisbrod's students also built small catchment systems at the school latrines, enabling the students to wash their hands after use since they lack plumbing, thus helping to prevent one of the major illnesses in rural Africa, namely severe diarrhea. The students did their best to use only products in the construction that can be found locally in Masindi, because if something breaks and the part can only be found in a big city far away, then, as Weisbrod says, "it doesn't exist."

The other project was to construct a weather station, purchased in the U.S. and tested in Israel. This station will be part of a network to predict climate change in Africa. It will transmit online data, free to everyone, about local weather conditions, giving climate scientists enormously important, and previously non-existent, information about Africa, the "ground zero" of climate change.

Prof. Weisbrod's course is a unique feature of the AKIS curriculum, setting it apart from other graduate programs in Israel. It exposes the students to the real-world water problems of millions of people in the rural areas of developing countries, while also solving some of these problems on a small, local scale. Prof. Weisbrod notes the importance of "bridging between academia and the low-tech solutions needed" in impoverished countries because in today's world of globalization and mass migrations, "the world is all connected." Through this course, AKIS students realize and take with them into their future careers the fact that climate change and water problems in Africa affect us all.

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Fifth International Conference on Drylands, Deserts and Desertification to Address a Broad Spectrum of Topics

The Fifth International Conference on Drylands, Deserts and Desertification will take place at the BIDR on November 17-20, 2014. The theme this year is "Healthy Lands—Healthy People."

As in the previous gatherings, this biennial conference will bring together top scientists, scholars, policy makers and practitioners who will share their expertise on diverse topics ranging from soil and land restoration to public health in the drylands to drip irrigation to desertification processes in China and Mongolia, among many others. According to Prof. Isaac Meir, co-chair of the Conference Organizing Committee, "the previous conferences have set a high standard, but the upcoming conference focuses the discourse on a number of new issues: desert communities and livelihoods, the uptake of green technologies, and historical and archaeological perspectives on desertification, just to offer a few examples."

This holistic approach is expressed in the planned keynote presentation by Architect Francis Kéré, of the Kéré Architecture Firm, which is based in Berlin with an affiliate in Burkina Faso. Kéré will be giving a talk entitled "Social Architecture, Building in Africa." His work with rural communities in Africa, including building schools there, and the upgrade of traditional technologies is acknowledged worldwide, and he will contribute an important perspective to the proceedings.

The conference, as in past years, is being held in collaboration with UNESCO, the United Nations Convention to Combat Desertification (UNCCD) and Israel›s Ministry of Foreign Affairs. This year also brings an exciting new collaboration with the British Council who is helping to sponsor and organize a joint UK Commonwealth-Israel session on Technological and Scientific Advances in Combatting Desertification.

Meir expects that the conference will draw, as it has previously, some 500 participants from nearly 60 countries, including many in Africa and Asia, since it has become, as he notes, "a world event." More details about the conference can be found at its website, www.desertification.bgu.ac.il.

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