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REVERSING DESERTIFICATION TO ENHANCE FOOD SECURITY



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Desertification Day Header

By Dr. Stefan Strohmeier, Dr. Mounir Louhaichi, and Dr. Azaiez Ouled Belgacem

This year's Desertification and Drought Day theme is **Food. Feed. Fiber.** focusing on links between consumption and land resources. Desertification is caused by the over-use of the land's resources by humans, usually for agriculture, as well as climatic variations. Yet, as populations grow, consumption inevitably increases so in the highly climate-vulnerable non-tropical drylands where ICARDA has operated for over four decades, we introduce approaches to create agricultural environments that are more resilient to communities' increasing needs.

Joint efforts of ICARDA's Water Land and Ecosystem (WLE) program and its Resilient Agricultural Livelihood Systems (RALS) program aim to optimize the management of resources such as water, vegetation, and soil, slow down and reverse degradation, and rehabilitate worn-out

environments. And with communities at the center of our research, our ongoing projects combat desertification by integrating innovative technologies with key local knowledge and ensure their ownership of the solutions.

ICARDA's researchers in agronomy, soil, water, land, and rangelands vegetation management disciplines collaborate with desert communities to protect rangeland health through unique and integrated soil and water conservation technologies, afforestation of landscapes with multi-purpose species (herbaceous, shrubs and trees), and better livestock management programs (grazing control). Our water management solutions include maximizing in-situ storage of water in rainfed agriculture and rangelands through conservation interventions; improving on-farm water use for higher water and land productivity; and the safe use of treated wastewater for the production of feed and forage.



Our current projects include:

- Improving soil health and watershed resilience in the dry, mountainous areas of Tajikistan. A sustainable land management project being implemented by Caritas Switzerland and ICARDA increases vegetative cover and soil-fixing root structures while enhancing soil structural health in the long term. This forms stable soil aggregates for better erosion resistance and rainwater infiltration characteristics. Scaled up, this reduces large-area surface runoff, debris flow, and landslides after heavy rainstorm events, which can devastate smallholder farmers' fields, and threaten downstream infrastructure livelihoods. Such approaches can reduce high costs from environmental degradation as demonstrated through [**THIS PROJECT**](#) supported by the World Bank.

- In Uzbekistan, the fast disappearing Aral Lake has exposed an immense amount of sediment and salt that feeds erosive windstorms. Salt accumulation in irrigated agriculture harms soils and crops and reduces crop biomass production and quality while sediments in the air endanger the respiratory health of communities. ICARDA, with the support of the World Bank, studies the impact on soil retention of rehabilitation options such as with locally native saxaul trees to reverse desertification and create resilient rangelands that can host sustainable agriculture – assuring soils and sediments remain at their location. The details of the study can be viewed [HERE](#).
- In Central Tunisia (semi-arid environment), we have established participatory sustainable silvopastoral restoration site that include water harvesting techniques, reseedings using native legume forage species and controlled grazing management. With full participation of the local community, these practices have significantly enhanced land productivity and livelihood of the silvopastoral community while alleviating further land degradation. This project has been funded by the FAO and its details can be viewed [here](#).



- In Southern Tunisia (arid environment), our research aimed at reviving the [traditional best practices for rangeland restoration](#) under climate change in the dry areas. The area is prone to severe degradation due to mismanagement and recurrent droughts. The most cost-effective technique to combat desertification is to [control the grazing pressure](#) by allowing natural vegetation to regenerate. The natural vegetation not only offers feed for livestock but also retain soil and reduce dust storms. This study is supported through the CGIAR Research program on Livestock (Livestock and Environment flagship).



- In the Arabian Peninsula, different techniques of rangeland rehabilitation and management including rest, reseeding indigenous range species combined with water harvesting techniques, and controlled grazing according to a participative approach. The beneficial effect of these techniques restoration is well observed in the significant increase of the plant cover, reducing thus the risk of desertification, and the regeneration of the palatable and high range value species mostly grasses as well as the key species of the plant communities. On the other hand, a potential solution to water and rangeland problems in the Arabian Peninsula is to develop production and rehabilitation systems based on forage species already well adapted to the regional environment. Encouragement for the adoption of high water use efficient grasses (*Cenchrus ciliaris* and *Panicum maximum*) and the legume Butterfly pea

(*Clitoria ternatea*) has led to a significant reduction of the amount of irrigation water required and sustainable high-quality forage production at the farm level.



Rehabilitated degraded rangeland site in Al Wafra (Kuwait)

- And in Jordan, we have combined an ancient ‘Marab’ technique with innovative new approaches and climate-resilient, water-efficient plant varieties to rehabilitate rangelands. Marabs involve creating areas of relatively flat land that slows water flow after rainfall, allowing more moisture retention and less degradation both locally and further downstream. The technique has significantly reversed desertification and boosted the local barley yield.



Rangeland at rehabilitation start

Our research projects also help inform the international policies of various international organizations concerned with desertification. As members of the [WOCAT \(World Overview of Conservation Approaches and Technologies\)](#) steering committee, ICARDA collaborated on developing the WOCAT2020+ initiative to improve land resources and ecosystems (including soils, water, flora, and fauna) and people's livelihoods by sharing, enhancing, and using researched and tested knowledge on sustainable land management (SLM). Our researcher serves on the UNCCD Intergovernmental Working Group on Drought, and ICARDA actively participates in UNCCD COP meetings and organizes side events to showcase collaborative research findings.



Rangeland post-rehabilitation

There is still much work left towards solving the agricultural issues of the non-tropical drylands. As climate change intensifies and populations grow, pressure on resources will intensify. A lack of food security will further compound these problems by increasing regional instability putting even further pressure on land resources.

While the world considers its response to climate change, we are acting now to improve the resilience of farming livelihoods in drylands to try to get ahead of what we see as inevitable issues if fast global action isn't taken. Together with the communities we serve and our valuable partners and donors, we are significantly slowing and reversing dryland desertification, and our 'more with less' agricultural innovations and approaches can enable an environmentally sustainable way of life for millions, if not billions of people throughout the globe.

[**MORE ON OUR WATER & LAND RESEARCH**](#)

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