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Local and global implications of ecosystem restoration of degraded arid farmland

Stefan Leu[1], **Amir Mor-Mussery**[1] and **Michael Ben-Eli**[2]
[1]Ben Gurion University of the Negev, Israel
[2]The Sustainability Laboratory, USA

Stopping and reversing desertification and land degradation can contribute significantly to global food security and sustainable development while mitigating global warming. We have tested rehabilitation technologies aiming at maximizing environmental and economic benefits in four research plots along the arid-semi-arid interface (200 mm mean annual precipitation). The resulting insights were applied in 2012 to 15 hectares of heavily degraded farmland at Project Wadi Attir, an initiative to establish a model sustainable agricultural operation in the Northern Negev, Israel. The technologies applied included strict protection from grazing, erosion control by terracing and soil conservation and planting of about 3000 native and agroforestry trees (over 30 species), carefully selected for requested ecosystem services. All aspects of ecosystem rehabilitation including soil quality, biodiversity, biological productivity and carbon balance were monitored for five years. Soil organic matter increased by about 1% compared to untreated control plots. Key nutrient pools (NPK) showed gradual but significant increases in the conserved plots compared to the degraded control plots. Better water conservation by terraces, higher water infiltration and lower evaporation due to shade and litter accumulation lead to significantly increased soil moisture in the conserved plots. All three factors together contributed to 3-5-fold higher rainfed herbaceous biomass productivity in the restored areas compared to nearby control plots. Among the tree species planted, some showed annual rainfed timber production of over 10 kg per year and tree, adding to carbon sequestration and economic viability. Biodiversity recovery was facilitated by the protection of biodiversity hotspots resulting in rapid five-fold increase in the numbers of plant species and bird species. On a global scale such approaches would contribute to mitigation of global warming, climate resilience and protection of biodiversity in degraded agro-ecosystems, combat desertification and provide food, fodder and income to the inhabitants of marginal dryland areas worldwide.

Biography

Stefan Leu is working as a Professor at Microalgal Biotechnology Laboratory, Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev, Sede-Boker Campus, Israel. His international experience includes various programs, contributions and participation in different countries for diverse fields of study. His research interests reflect in his wide range of publications in various national and international journals. He is the Editorial Board Member and serves as a Member of various associations, apart from being an author for many books.

stefanleu3@gmail.com

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