



Semi-Arid Lab for Scalable Agrivoltaics

Short text about what is agrivoltaics, what impact it can have, etc.

Research Areas



Ecophysiology in Agrivoltaics Systems



Scaling Up Agrivoltaics.

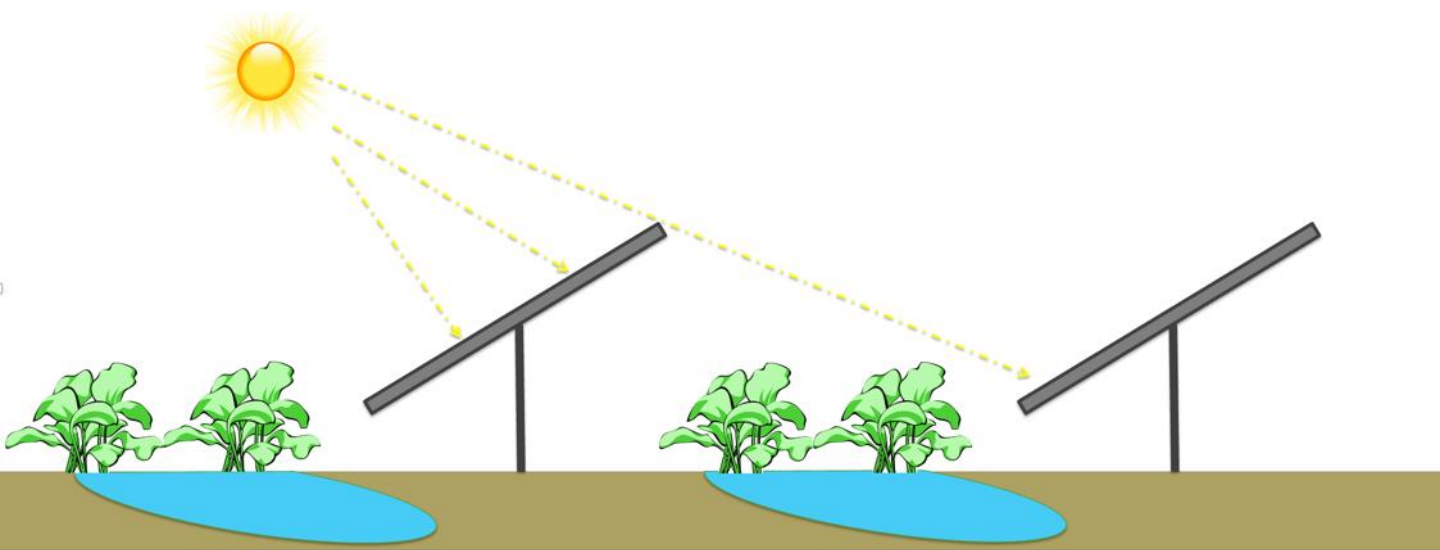


Scaling Out Agrivoltaics



Ecophysiology in Agrivoltaics Systems

Blurb about research questions

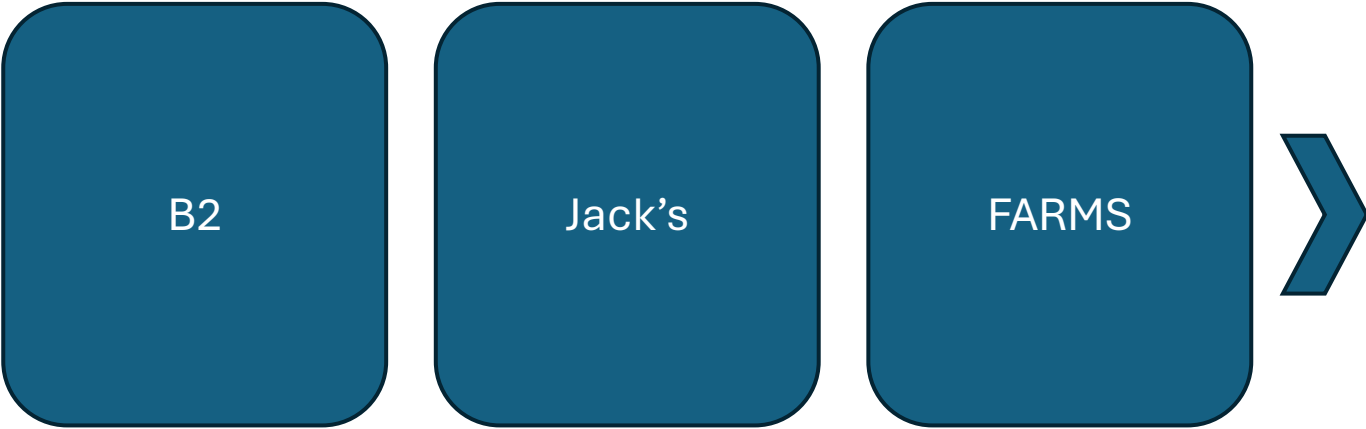




Ecophysiology in Agrivoltaics Systems

Blurb about research questions

Projects & Sites



Outputs

Article | Published: 02 September 2019

Agrivoltaics provide mutual benefits across the food–energy–water nexus in drylands

Greta A. Barron-Gafford¹, Mitchell A. Paves-Zuckerman, Rebecca L. Minor, Leland F. Suttler, Isiah Barnett-Moreno, Daniel T. Blackett, Moses Thomason, Kirk Dimond, Andrea K. Gerlak, Gary D. Nabhan, Jordan L. Macknick

Nature Sustainability **2**, 848–855 (2019) | [Cite this article](#)

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Abstract

The vulnerabilities of our food, energy and water systems to projected climatic change make building resilience in renewable energy and food production a fundamental challenge. We investigate a novel approach to solve this problem by creating a hybrid of colocated agriculture and solar photovoltaic (PV) infrastructure. We take an integrative approach—monitoring microclimatic conditions, PV panel temperature, soil moisture and irrigation water use, plant ecophysiological function and plant biomass production within this ‘agrivoltaics’ ecosystem and in traditional PV installations and agricultural settings to quantify trade-offs. We find that shading by the PV panels provides multiple additive and synergistic benefits, including reduced plant drought stress, greater food production and

SCIENTIFIC REPORTS

OPEN

The Photovoltaic Heat Island Effect: Larger solar power plants increase local temperatures

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While photovoltaic (PV) renewable energy production has surged, concerns remain about whether or not PV power plants induce a ‘heat island’ (PHIC) effect, much like the increase in ambient temperature relative to wildlands generated by an Urban Heat Island effect in cities. Translators to PV plants after the way that incoming energy is reflected back to the atmosphere are albedo, cloud, and evapotranspiration because PV plants change the albedo, vegetation, and structure of the terrain. Prior work on the PHIC has been mostly theoretical or based upon simulated models. Furthermore, past empirical work has been limited to crops in a single house. Because there are still large uncertainties surrounding the potential for a PHIC effect, we examined the PHIC empirically with experiments that spanned three houses. We found temperatures over a PV plant were regularly 3–4 °C warmer than wildlands at night, which is a direct contrast to other studies based on models that suggested that PV systems should decrease ambient temperatures. Debating the underlying cause and scale of the PHIC effect and identifying mitigation strategies are key to supporting decision-making regarding PV development, particularly in arid/semi-arid landscapes, which are among the most likely for large scale PV installations.

Electricity production from large-scale photovoltaic (PV) installations has increased exponentially in recent decades¹. This proliferation in renewable energy production and PV generation development as a response to the acceptance and use effectiveness of this technology^{2,3}. Corresponding with this increase in installation has been an increase in the number of the types of solar PV⁴, including those for the effects of PV to ‘cool’ energy needs^{5,6}. A growing concern that remains understudied is whether or not PV installations cause a ‘heat island’ (PHIC) effect that warms surrounding areas, thereby potentially reducing a widely tested ecosystem function in wildlands, and human health and even have value in residential areas⁷. As with the Urban Heat Island (UHI) effect, large PV power plants induce a landscape change that reduces albedo or the modified landscape to urban and, therefore, less reflective. Lowering the albedo affects the heat (PHIC) in natural spaces⁸ in the case of PV power⁹, where the energy balance of albedo, cloud, and evapotranspiration is altered.

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Harvesting the sun twice: Energy, food and water benefits from agrivoltaics in East Africa

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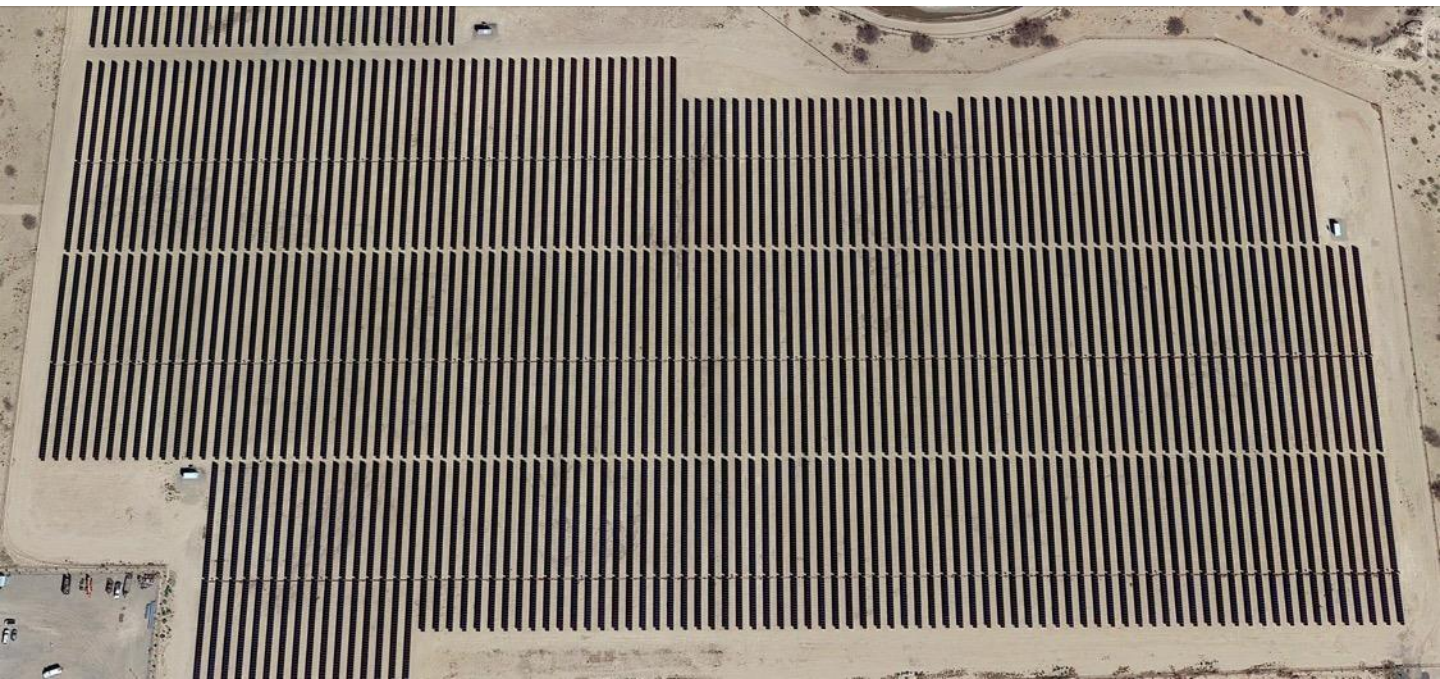
Agrivoltaics
Energy production
Food security
Renewable energy
Sustainable development

ABSTRACT

Food, energy and water insecurity are interconnected challenges facing many communities in East Africa. Agriculture, which is the primary source of livelihoods, is threatened by climate change, including the effects of drought, soil degradation, and water scarcity. Agrivoltaics, which combine solar photovoltaic (PV) panels with agriculture, may provide a solution to these challenges. This study examines the effects of agrivoltaics on food, energy and water security in East Africa. The study was conducted in two sites in Kenya and Tanzania. The results show that agrivoltaics can increase food production and water security while also generating revenue from the PV panels. The study also found that agrivoltaics can reduce the risk of drought and soil degradation. The results suggest that agrivoltaics may be a viable solution to the challenges of food, energy and water insecurity in East Africa.

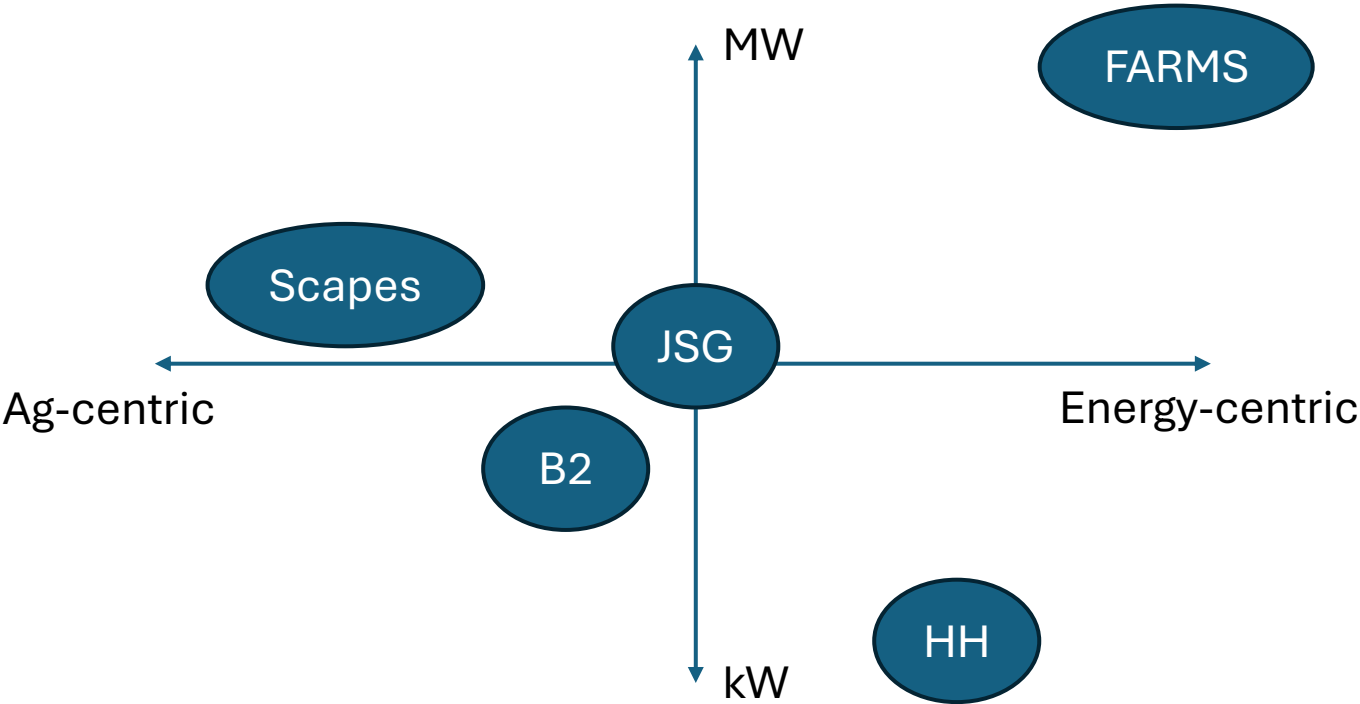


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Agrivoltaics from kW to MW scale

Blurb about research questions





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Scaling Out Agrivoltaics – Impact across Contexts

Suitability & system design questions.

Partnerships for exploring agrivoltaics research questions across diverse social-ecological contexts.

A big way we do that is through Agrivoltaics Living Labs

AGRIVOLTAICS LIVING LABS A GLOBAL COLLABORATORY

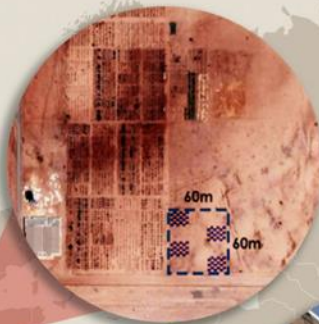
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USA



Research
Center for Food
& Development
Mexico



Kibwezi
Living Lab
Kenya



Mohammed VI
Polytechnic University
Morocco

Dead Sea & Arava
Science Center
Israel





Training & Education for Agrivoltaics

Why is education and training on agrivoltaics so important?



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Global School of Agrivoltaics



Interdisciplinary Opportunities





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