

# Best Management Practices to Minimize Impacts of Solar Farms on Landscape Hydrology and Water Quality



Workshop lead: Lauren McPhillips

April 6-7, 2023

Manassas VA and virtual

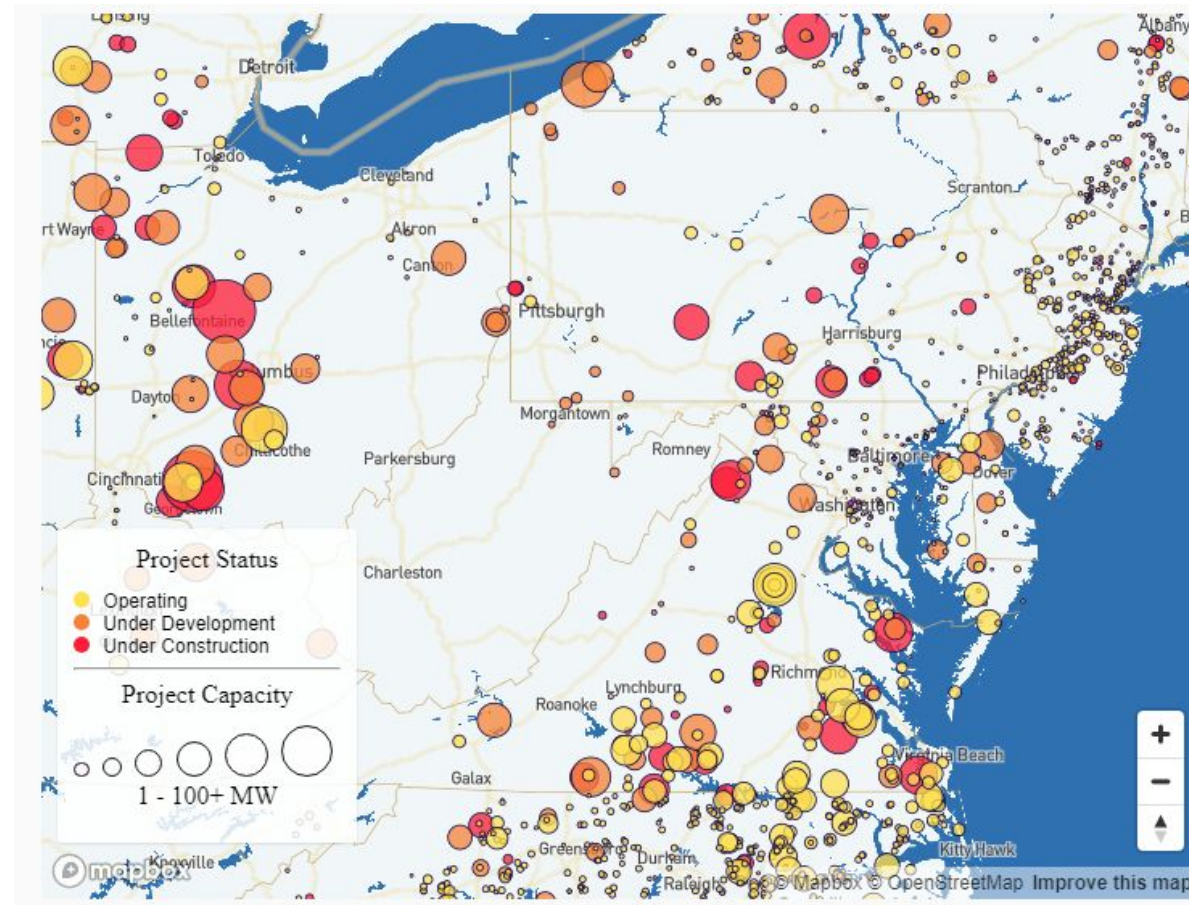
## *Workshop Team*

- *Lauren McPhillips, Assistant Professor, Pennsylvania State University*
- *Anthony Buda\*, Research Hydrologist, USDA ARS*
- *Zachary Easton\*, Professor + Extension Specialist, Virginia Tech*
- *W. Lee Daniels, Professor Emeritus, Virginia Tech*
- *Siobhan Fathel, Asst. Teaching Professor, Pennsylvania State University*
- *Assistant Professor, Susquehanna University (as of Aug 2023)*
- *John Ignosh, Extension Specialist, Virginia Tech*
- *Cibin Raj, Associate Professor, Pennsylvania State University*
- *David Sample, Professor + Extension Specialist, Virginia Tech*

**Total Attendees: 59-** representing industry, academia, governmental organizations, NGOs, and community members

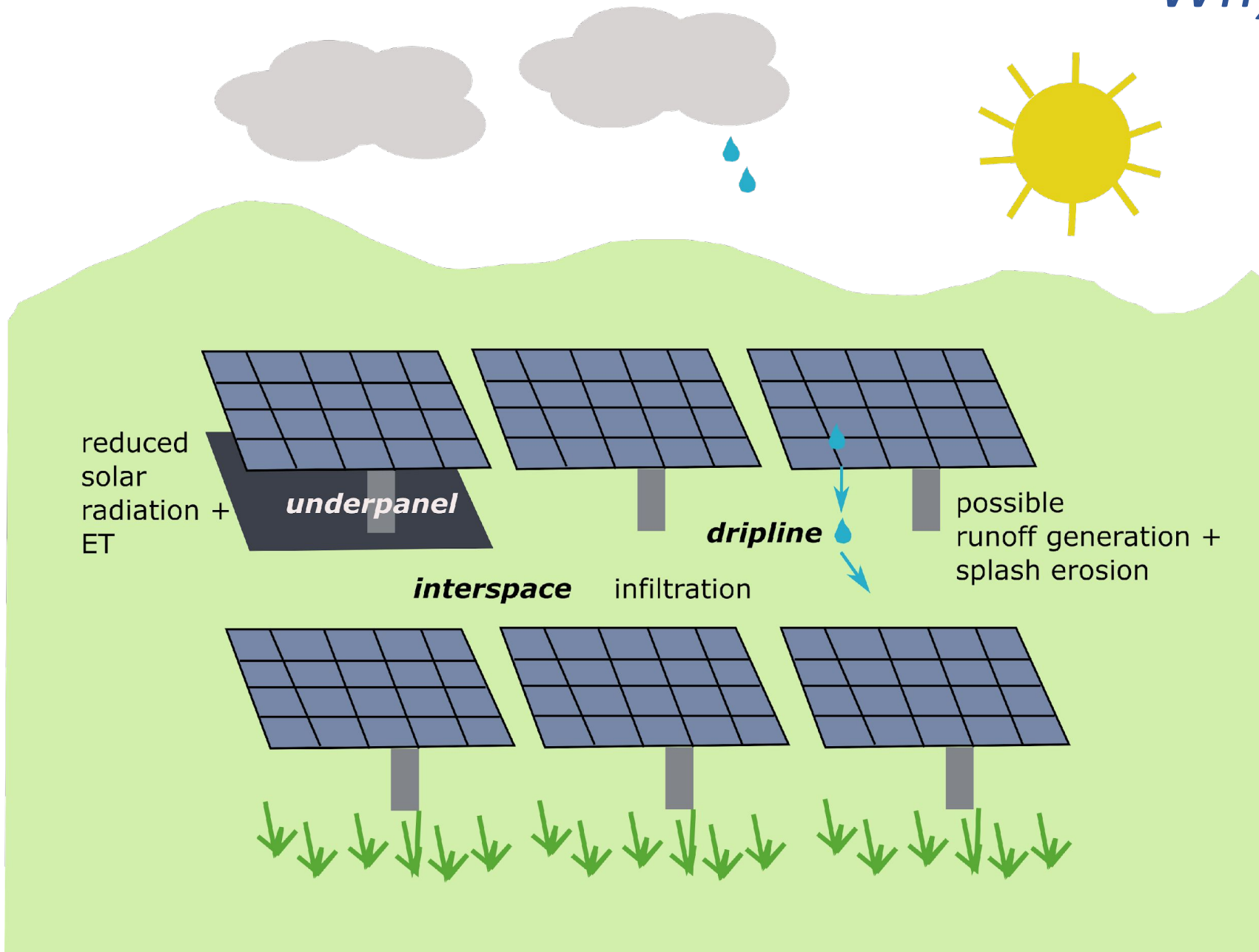
# Why this workshop?

There is rapid development of solar farms happening in our region, and we want to understand implications of this land use transition, and support best implementation practices



Map source: Solar Energy Industries Association

# Why this workshop?



There is the potential to alter vegetation, soils, and hydrology, depending on how a solar farm is implemented



## *Workshop Scope*

- Setting the Stage
- State of the Science
- Regulatory Panel
- Industry Panel
- Field trip to Dominion Energy solar farm
- Breakout discussions: identifying gaps, needs, and points of coordination
- Group discussion and wrap-up

# State of the Science

Relatively limited published research (< 20 studies in 2022), not in mid-Atlantic region

Modeling updates: Efforts ongoing to improve solar representation in hydrologic models. PV-SMaRT team has calibrated a model of solar farms to create a tool to improve runoff calculations for solar farms.

Field updates:

Soil and vegetation changes on solar farms in Midwest. Net decrease w/ bare soil, but improvement w/ healthy meadow vegetation. Potential for co-benefits.

On central PA solar farms, documenting re-distribution of water, less vegetation under panels. But combo of healthy vegetation between panels + structural stormwater management able to manage runoff.

# High priority science gaps

---

A better understanding of how utility-scale solar farms, as implemented in the Chesapeake Bay watershed impact **hydrology**, **soil health**, and **vegetation** during construction and through the lifetime of the solar farm

A need for research that covers a range of physiography, land uses, and scale





# High priority science gaps

---

Development and evaluation of **management practices** that can minimize impacts of USS on landscape hydrology and water quality across the diverse landscape types in our region

Develop solar farm- specific **runoff modeling approaches** that are validated for our region, to support design of best management practices







# Key practices to support sustainable solar farm development

Incentivizing selection of **optimal sites** for solar implementation- particularly considering ways to leverage existing impervious surface (e.g. parking lots, warehouse rooftops) and marginal lands (e.g. brownfields, marginal agricultural land)

Supporting soil health through **minimizing soil disturbance and removal** during USS construction process





## Key practices to support sustainable solar farm development

Implementation of **appropriate erosion and sediment control** during construction, and oversight to ensure compliance



Facilitating **rapid establishment of perennial vegetation**, with consideration of opportunities for other co-benefits (e.g. habitat provision) in vegetation selection process



# Recommendations to address gaps



## Support of new field and modeling research

- Support for field and modeling research that is region-specific and practitioner-relevant
- Testing and customization of the PV-SMaRT runoff calculator tool for our region
- Appropriate representation of solar farms in the Chesapeake Bay model (possible expert panel)



# Recommendations to address gaps



## Info sharing and coordination

- Continued industry, academic, governmental, and community collaboration, and information-sharing
- A clearinghouse or platform for sharing information and data related to solar farm planning, function, and management in our region



# Recommendations to address gaps



## Info sharing and coordination

- Demonstration solar farm site(s) with best practices showcased, opportunities for integrated research, and ability for interaction and/or visibility from public.

# Comments on report drafts

- Improved content in industry panel summary to try to reduce technical jargon
- Tweaked language around recommendations for solar farm land type in Chesapeake Bay model