

Infrastructure Interdependencies in Extreme Heat Emergencies

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With Guest Lecturer Dr. Thomas P. Seager

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Abstract:

The city of Phoenix AZ set new all-time record-breaking temperatures at 119F during June 2017. Although unprecedented, the nearly week-long heat wave passed without extraordinary incident. Some regional flights were grounded, as smaller jets were unable to operate, and new all-time highs were established in electrical power demand, but adverse health effects failed to match the temperature extremes, as water, power, roadway transportation, communication, emergency response and other infrastructure systems continued reliable operation. By contrast, deadly heat waves in less extreme locations, such as Chicago in 1995 and northern Europe in 2003, have killed tens of thousands. This presentation describes pathways of disruption in coupled energy, water, and transportation systems that, if experienced during an extreme heat event, would be catastrophic for the City of Phoenix. Results emphasize the need for enhanced adaptability and flexibility of existing infrastructure systems that account for climate non-stationarity and infrastructure interdependencies. Mitigating vulnerability will require innovative solutions to protect populations from extreme heat, even in the case of massive and cascading infrastructure failures.



Dr. Thomas P. Seager

Biography:

Dr. Thomas P. Seager is an Associate Professor in the School of Sustainable Engineering & the Built Environment at Arizona State University in Tempe, Arizona. Dr. Seager leads research teams working at the boundaries of engineering and social science to understand innovation for resilient infrastructure systems, including the life-cycle environmental consequences of emerging energy technologies, novel approaches to teamwork and communication in socio-technical integrative settings, and engineering ethics education. Current research sponsors include the National Science Foundation, the US Army Corp of Engineers, the Environmental Protection Agency, and several industry partners. Dr. Seager is the Faculty Director of the Resource Innovation Solutions Network (RISN), a partnership of between ASU, City of Phoenix and other local municipalities for fostering circular, closed-loop economies. Additionally, Dr. Seager serves as Chairman and Chief Executive Officer of two startup companies. The first is eXperiential Sustainability Ethics Training (XSETGames, LLC), which creates digital simulations for examining economic and ethical dimensions of wicked problems including pharmaceutical pricing, intergenerational equity, the Tragedy of the Commons. These simulations have been used by corporations, government agencies, and higher education clients, including dozens of Universities on three different continents. The second is Building Integrated Solar Thermal Electricity Generation (BISTEG-USA, LLC), which is developing full-scale working sculptures that create electricity from sunlight without using photovoltaics. Lastly, Dr. Seager founded the non-profit Sustainability Conoscente Network as a mechanism for sharing knowledge related to systems approaches to sustainable technologies. The Conoscente holds the *International Symposium on Sustainable Systems and Technologies* in May of every year (issst2017.net).

