2022 Birdsall-Dreiss Distinguished Lecturer

Schedule 2022 lecture:

Institutions can schedule a visit by completing the request form at https://tinyurl.com/27bwxft7

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Abe Springer is Professor of Ecohydrogeology and was the Inaugural Director of the School of Earth and Sustainability at Northern Arizona University. He received his B.A. in Geology from the College of Wooster and his M.S. and Ph.D. in hydrogeology from The Ohio State University. Since arriving at NAU in 1994, he has taught hydrogeology, geology of Arizona, environmental geology, applied geology, groundwater modeling, karst hydrogeology, springs ecohydrology and other courses. Dr. Springer and his students study local and regional groundwater flow systems and human impacts on them, apply principles of sustainability to aquifer management through models, quantify the hydrological function of groundwater-dominated ecosystems, study the role of land-use change and disturbance on groundwater flow systems, study karst hydrogeology, and conduct restoration of springs and riparian ecosystems. He has collaborated with ecologists, botanists, plant physiologists, foresters, land managers, engineers, and many different sub-disciplines within the Earth sciences. Dr. Springer and his students have studied more than 1,000 springs the past 25 years in Western North America and beyond. With colleagues, he has developed comprehensive springs ecosystems inventory, assessment, and classification systems. In 2007, he was the Fulbright Visiting Chair of Water and Environment at the University of Lethbridge, Alberta, studying the ecohydrogeology of springs of Western Canada. He is a Fellow of the Geological Society of America and past chair of the Hydrogeology Division of GSA.

First consideration will be given to requests received prior to November 20, 2021. Lectures will be given to a variety of types of institutions to promote the discipline of hydrogeology. The LaMoreaux Fund supports lectures outside of North America. **Institutions can schedule a visit by completing the request form at https://tinyurl.com/27bwxft7**

Springer will present one lecture on one of the two topics described below. Also, Dr. Springer would welcome invitations to include a 1/2-day, host-organized ***workshop*** with a site visit to a spring.

1. The Stories Told by Springs

Springs occur where groundwater emerges at or near the Earth's surface. They integrate the hydrogeological conditions of the catchments from which they discharge. They are very cost-effective places to measure and monitor aquifers and teach hydrogeology. Each spring has unique characteristics and responses to various natural and anthropogenic stressors. Springs discharging from local or regional aquifers tell different stories, which influence the ecological and cultural significance of the springs. Many native cultures have an emergence story associated with a spring. Climate change and land management practices produce different responses for different types of aquifers. Lessons learned from springs are important for guiding future land and water management decisions, especially if data can be archived, published, and shared through open sources. Land and resource management agencies can benefit by including multiple continuous, interdisciplinary springs monitoring sites in their networks.

2. Upland Land Management Influences on Hydrogeologic Processes

Landscape-scale, upland forest management practices affect hydrological processes and specifically groundwater recharge. The Four Forest Restoration Initiative (4FRI) is a landscape-scale, collaborative effort to restore fire-adapted *Pinus ponderosa* (Ponderosa pine) ecosystems and reduce the threat of catastrophic wildfire throughout four National Forests along the southern Colorado Plateau in Arizona. The forests generate all water for rural areas and nearly ½ of the water for downstream desert cities. The first treatments, which began in 2014, include over 2,400 km^2 within the Kaibab and Coconino National Forests. Treatments include an initial mechanical thinning to reduce the basal area of the forest, followed by the restoration of a regular, low-intensity fire regime to maintain the reductions in basal area. Models were developed to quantify how landscape-scale forest restoration and climate projections will affect groundwater recharge to regional aquifer systems, springs, and streams. Climate projections bracket future precipitation values for the study area and were simulated in the model with predicted changes in recharge. Based on historical experimental watershed studies in southwestern U.S. pine forests, recharge is projected to increase when the hydrologic conditions are favorable. Paired watershed studies were established to observe the hydrological responses of low, medium, and high levels of mechanical forest thinning. Results from the pre-treatment, calibration phase of the paired watershed studies indicate the significant influence of climate on watershed response in semi-arid climates.

Workshop: Springs Ecosystem Inventory and Assessment

A half-day, field workshop in a springs ecosystem closest to the host institution is encouraged. The lecture host is encouraged to invite interdisciplinary students along with local expert(s) on the botany, aquatic ecology, cultural geography, environmental history or other multidisciplinary aspects of the local spring. The Springs Stewardship Institute's Level 2 Springs Inventory Protocol and Springs Ecosystem Assessment Protocol will be demonstrated and used to develop a monitoring and management plan for the spring. Students will be encouraged to upload the data to the cloud-based Springs Online database: https://springstewardshipinstitute.org/. A workshop will only be scheduled after consultation with Dr. Springer.