



In partial fulfillment of the requirements for the degree of

**Doctor of Philosophy**  
**Bing-Bing Zhou**

will defend his dissertation

**Scientific foundations and problem-driven case studies of  
landscape sustainability: Sustainability of human-environment  
systems through the lens of the landscape**

Thursday, April 9, 2020

2:00pm

[Zoom Meeting](#) ID: 626 516 486

Faculty, students, and the public are invited.

Supervisory Committee:

Dr. Jianguo Wu (chair)

Dr. Rimjhim Aggarwal (member)

Dr. John M. Anderies (member)

Dr. Marcus A. Janssen (member)

Dr. Billie L. Turner II (member)

## Abstract

The science community has made efforts for over a half century to address sustainable development, which gave birth to sustainability science at the turn of the twenty-first century. Along with the development of sustainability science during the past two decades, a landscape sustainability science (LSS) perspective has been emerging. As interests in LSS continue to grow rapidly, scholars are wondering what LSS is about and how LSS fits into sustainability science, while practitioners are asking how LSS actually contributes to sustainability in the real world. To help address these questions, this dissertation research aims to explore the currently underappreciated problem-driven, diagnostic approach to enhancing landscape sustainability through an empirical example of urbanization-associated farmland loss (UAFL). Based mainly on multimethod analysis of bibliographic information, the dissertation explores conceptual issues such as how sustainability science differs from conventional sustainable development research, and how the past, present, and future research needs of LSS evolve. It also includes an empirical analysis of the problem of urban expansion and food security in a core-periphery system of China during 2000-2015, and proposes a different problem framing for farmland preservation such that stakeholders can be more effectively mobilized.

The most important findings are: (1) Sustainability science is not “old wine in a new bottle,” and in particular, is featured by its complex human-environment systems perspective and value-laden transdisciplinary perspective. (2) LSS has become a vibrant emerging field since 2004-2006 with over three-decade’s intellectual accumulation deeply rooted in landscape ecology, yet LSS has to further embrace the two featured perspectives of sustainability science and to conduct more problem-driven, diagnostic studies of concrete landscape-relevant sustainability concerns. (3) Farmland preservationists’ existing problem framing of UAFL is inappropriate for its invalid causal attribution (i.e., urban expansion is responsible for farmland loss; farmland loss is responsible for decreasing grain production; and decreasing grain production instead of increasing grain demand is responsible for grain self-insufficiency); the real problem with UAFL is social injustice due to collective action dilemma in preserving farmland for regional and global food sufficiency. The present research provides broad implications for landscape scientists, the sustainability research community, and UAFL stakeholders.