

ZHEYI LIU

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SYSU-Alberta Joint Lab for Biodiversity Conservation,
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EDUCATION

Sun Yat-sen University	Guangzhou, China
PhD, Ecology	Expected June 2021
Supervisor: Prof. Fangliang He, Prof. Chengjin Chu	
Sun Yat-sen University	Guangzhou, China
BA, Major: Biology, Minor: Sociology	June 2016

FELLOWSHIPS AND AWARDS

SYSU for Excellent Graduates Grant, Sun Yat-sen University	2017-18, 2016-17
First Class Graduate Fellowship, Sun Yat-sen University	2017-18, 2016-17
Second Class Outstanding Students Fellowship, Sun Yat-sen University	2015-16
Third Class Outstanding Students Fellowship, Sun Yat-sen University	2014-15, 2013-14

RESEARCH EXPERIENCE

Evolution of Urban Scaling in Chinese Urban System, May 2018-Present

I conducted a temporal analysis of allometric scaling behavior of multiple physical, demographic, socioeconomic, and environmental attributes in Chinese urban system. In my results, the urban scaling in China manifested a large variation among years but it was approaching the theoretical range year by year. Huge fluctuations in the results often occurred at the same time as big economic events and introduction of major policies.

- ♦ Collected urban entities data for 298 Chinese cities (all municipality and prefecture-level cities in 2018) in the years 1984-2016.
- ♦ Conducted a temporal analysis of allometric scaling behavior of multiple physical, demographic, socioeconomic, and environmental attributes in Chinese urban system.
- ♦ Tried to investigate several factors affecting urban scaling, such as the unevenness of urban development, large-scale migration and policies.

Ecological Network Analysis, Feb 2018-May 2018

I analyzed a plant-mycorrhizal fungi network, linking traits and phylogeny of plant species to their network structural properties. My results suggested that it was topologically very different from above-ground mutualistic networks but showed a similar relationship between network structure and ecosystem functioning.

- ♦ Constructed the plant-mycorrhizal fungi network from 114 (38*3) root samples of 38 plant species in HSD tropical forest plot (Zhaoqing, China), with 611 mycorrhizal fungi OTUs found in root tissues. (Dataset is from Zihui Wang)
- ♦ Measured global topological properties (nestedness, modularity, connectance specificity and degree distribution) of plant-mycorrhizal fungi network.
- ♦ Calculated species' role (a class of structural metrics on individual node level in ecological context, including normalized degree, species strength, specificity, C-score, Z-score and so on) and species functional role defined with trait and phylogeny information of plant species.
- ♦ Did regression analysis between species' role and functional role.

Comparing Networks Complexity Indices, Nov 2015-May 2016

I reviewed several complexity indices and compare the utilities of them in quantifying networks complexity. My results showed that the Spanning Tree Sensitivity Difference (STSD) was the most versatile complexity index and the discrimination of different complexity level mainly came from the local structural information of the network.

- ♦ Reviewed 67 static topological networks complexity indices (Shannon entropy, computational complexity, spanning tree sensitivity, etc.) and the criteria and methods of complexity measures.
- ♦ Generated hypothetical networks designed the complexity from simple to complicated and empirical food webs.
- ♦ Evaluated the utility of these complexity measures with three criteria that medium articulation, strong discriminatory power and the ability to distinguish real networks and their random copies.
- ♦ Classified the complexity indices by clustering according to their response to hypothetical networks and empirical networks on different complexity level.

PUBLICATIONS AND PRESENTATIONS

Zheyi Liu, Fangliang He. Fluctuating urban scaling in China: Urban development under effective policies. Article manuscript in progress, to be submitted for publication in summer/fall 2019

“Species’ role in a plant-mycorrhizal fungi network is determined by their trait role and phylogenetic role”, Seminar on Habitat Fragmentation and Biodiversity Conservation in Qiandao Lake (Hangzhou, China), Apr 2018

“A simulation of food webs based on bio-energy model”, Introduction to Network Analysis in Life Sciences Workshop, Transmitting Science (Barcelona, Spain), Sep 2017

“Quantifying Networks Complexity”, SYSU Ecology and Evolution Seminar Series, Sun Yat-sen University, Sep 2016

PROFESSIONAL DEVELOPMENT

ECNU Advances and Frontiers of Biodiversity Research Methods Summer School	Prof. Fangling He, Prof. Jian Zhang and Prof. Guochun Shen, East China Normal University (Shanghai, China)	2018
Introduction to Network Analysis in Life Sciences Workshop	Dr. Diego Rasskin-Gutman and Dr. Borja Esteve-Altava, Transmitting Science (Barcelona, Spain)	2017
CLS Systems Biology/Computational Biology Summer School	Prof. Chao Tang et.al., PKU-THU Center for Life Sciences (Beijing, China)	2015
Core courses:		
<i>Data Analysis and R Language</i>	Prof. Xubing Liu and Prof. Chengjin Chu	2018
<i>Community Ecology</i>	Prof. Fangliang He et.al.	2017
<i>Population Genetics</i>	Prof. Chung-I Wu	2017
<i>Advanced Statistics in Biology</i>	Prof. Fangliang He	2016
<i>Numerical Ecology</i>	Prof. Pierre Legendre	2016
<i>Computational Sociology</i>	Prof. Yucheng Liang	2015

SKILLS

- ♦ Advanced statistical modeling and data analysis (R and Python, e.g. GLM, PCA, K-means clustering, variance analysis)
- ♦ Network analysis (R, e.g. igraph, bipartite), Agent-based Modeling (R, Netlogo)

SERVICES AND AFFILIATIONS

Volunteer of the 5 th SYSU Ecology and Evolution Summer School, Sun Yat-sen University	Jul 2018
Organizer of SYSU Ecology and Evolution Seminar Series, Sun Yat-sen University	2017-present
Translator of the 7 th and 10 th chapter of <i>Individual-based Modeling and Ecology (Chinese version)</i> , ed. Chengjin Chu et.al. (Higher Education Press), forthcoming	Aug 2017-Oct 2017
Field investigator of the 2 nd forest plot census in the HSD Nature Reserve (Zhaoqing, China)	Sep 2019
President of SYSU South Campus Environmental Protection Association	2013-14