



Environmental Sciences Department  
College of Natural Sciences  
University of Puerto Rico  
Río Piedras Campus

## RESEARCH

Soil and Forest Ecology. My research focuses on (1) charcoal interpretation of historical fire activities and paleoclimate in forests, (2) Fibonacci structure in forest ecosystems, and (3) quantification of ecological niche for plants, and (4) controls on plant diversity.

## EDUCATION

- 1988-1992 Ph.D. in Forest Ecology and Soil Ecology. Department of Forest Sciences, Colorado State University, Fort Collins, CO. “Phosphorus transformations in soils: A new method and tree species effects”. Advisor: Dr. Dan Binkley.
- 1986-1988 M.S. in Natural Resources. School of Natural Resources and the Environment, University of Michigan, Ann Arbor, MI. “Pattern of Kirtland’s warbler occurrence in its summer habitat, northern Lower Michigan”. Advisor: Dr. Burton V. Barnes.
- 1978-1982 B. A. in Forest Science. Department of Forestry, Nanjing Forestry University, Nanjing, P. R. China.

## WORK EXPERIENCE

- 2004-Now Professor, Institute for Tropical Ecosystem Studies and Dept of Environmental Sciences, University of Puerto Rico—Río Piedras, San Juan, PR.
- 2012-Now Affiliated Professor, Nanjing Forestry University, Nanjing, China.
- 2002- 2012 Affiliated Research Professor and Soil Ecology Group Leader, Xishuangbanna Tropical Botanical Garden, Chinese National Academy of Sciences, Kunming, Yunnan, China.
- 1999-2004 Associate Professor, Institute for Tropical Ecosystem Studies, University of Puerto Rico, San Juan, PR.
- 2002-2003 Visiting Associate Professor (sabbatical leave), Department of Biology, National Cheng Kung University, Tainan, Taiwan.
- 1996-1999 Assistant Professor, Institute for Tropical Ecosystem Studies, University of Puerto Rico, San Juan, PR.
- 1992-1996 Scientist, Terrestrial Ecology Division, University of Puerto Rico, San Juan, PR.
- Faculty member, Department of Forest Sciences, Nanjing Forestry University, Nanjing, P.R. China.

## AWARDS, SERVICES, and RECOGNITION

### Journal Editor

- *Soil Biology and Biochemistry* (Subject Editor 2003-2013; China Special Issue co-editor, 2009);
- *Biotropica* (Special Section co-editor, 2004-2005).

- *Acta Botanica Yunanica* (Editorial board, 2006-2010)
- *Biodiversity* (Oversea subject editor, 2014-)

### **Review of Journal Articles** for

*Biology and Fertility of Soils; Biogeochemistry; Biotropica; Caribbean Journal of Sciences; Conservation Biology; Ecology; Ecological Applications; Ecosystem Science; Forest Science; Journal of Tropical Ecology; Oecologia; Plant and Soil; Soil Biology and Biochemistry; Soil Science Society of America Journal.*

### **Review of Proposals** for

*National Science Foundation, USDA Competitive Grants, World Wildlife Fund, National Science Foundation of China, Panel member.*

### **Media Interviews and Reports** by

*Adventure Magazine of National Geography 2007; Nuevo Dia, 2007; Inventio, March 2005, and 2007; US LTER Newsletter, 2003; Public TV Broadcasting 2003 (Taiwan); Min Shen Bao (Taiwan), Lian Ho Bao (Taiwan), Zhong Hua Ri Bao (Taiwan); and 5 other news papers in Taiwan 2003; The Science and Technology Chronicle, July 2001; Discover Magazine, September 1997; National Radio of Jamaica, September 1996; Dialogo, August 1996.*

### **Committees**

- ITES Personnel Committee (1999-2002), College Library Committee (1996-1999).
- Currently, I am working with the Chair of the Department of Environmental Sciences in the University of Puerto Rico to assess the needs of our Environmental Science Programs and revise our current academic curricular for both Bachelor's and Graduate degrees.

### **Academic Programs**

- Development of the China Initiative Program and help to recruit Chinese students (2008)
- Development of the Confucius Institute Program in UPR (2009)
- I participated in a committee led by the university president that conducted needs assessments for the training of students in the University of Puerto Rico for the 21<sup>st</sup> century and developed both the China Initiative Program and the Confucius Institute Program. These programs promoted the exchange of UPR and Chinese university students and scholars.

### **Research Productivity Awards**

- 1996 and 1999, University of Puerto Rico.
- Huang Kuan-Cheng Fellowship, 2003, The Chinese Academy of Sciences.

### **Fulbright Scholar**

2014

### **Sigma Xi**

1988

### **National Fellowship for Oversea Studies**

- 1986, Ministry of Forestry, P. R. China.

### **Outstanding Student Awards**

- 1978-1982, Nanjing Forestry University.

**TEACHING****Undergraduate Courses**

**Soils and the Environment:** University of Puerto Rico (2000–)

**Introduction to Environmental Sciences:** University of Puerto Rico (2009–)

**Ecology:** National Cheng Kung University (2002).

**General Ecology:** University of Puerto Rico (2001, 2004, 2005)

**Ecology Laboratory:** University of Puerto Rico (1999, 2000, 2001, 2002, 2006, 2007, 2008).

**Forest Ecology and Management:** Nanjing Forestry University (1982, 1983, 1984, 1985).

**Graduate Courses**

**Soils and the Environment:** University of Puerto Rico (2000–)

**Advanced Applied Ecology:** Nanjing Forestry University (2012–)

**Methods in Ecosystem Science:** National Cheng Kung University (2003).

**Biogeochemistry:** National Cheng Kung University (2002); University of Puerto Rico (2000, 2002, 2004, 2007). **Note:** This class was ranked by graduate students in 2002 as the top two most-welcome graduate classes in the Department of Biology, UPR.

**Tropical Forest Resources:** University of Puerto Rico (2001).

**INTERNATIONAL COLLABORATIONS**

I collaborated with Dr. Lucy How of the National Cheng Kung University of Taiwan on a project that examines the role of soil biota in plant litter decomposition between 2002 and 2005. Our goal is to develop a new decomposition model that includes soil biota as a driving variable for tropical ecosystems. I am a collaborator for the Long-term Ecological Research at the Nanjenshan site of Taiwan

I was affiliated with the Xishuangbanna Tropical Botanical Garden (XTBG) of the Chinese National Academy of Sciences as a research professor between 2003 and 2012. I lead a Soil Ecology Group in XTBG to conduct research on mechanisms governing the stabilization and destabilization of soil organic carbon, and on biotic origin of soil heterogeneity. My collaboration has been extended to Nanjing Forestry University and Shengyang Agricultural University since 2012.

I am affiliated with Nanjing Forestry University to work on mechanisms of latitudinal diversity gradient for plants and microbes.

My collaboration also extends to researchers from Argentina on the invasion of trees from China.

**STUDENTS**

**Post-doctoral Researcher:** Z. Liu (1995-2000), H. Ruan (1999-2002), Matthew Warren (2008-2012).

**Ph.D. Students:** Yiqing Li (1998, advisor), Shiyun Wen (2001, comm. member), Ligia Lebron (2005, comm. member), Matthew Warran (2008, advisor), Min Zhang (2008, advisor), Bin Han (2009, advisor), Wenjing Xu (2010, advisor), Lu Qiao (current, advisor), Lingling Shi (current, advisor), Xianbin Liu (current, advisor)

**Master Students:** Grizelle Gonzalez (1996, advisor), Yarinia Sanchez (2001, advisor), Johanna Santamaria (2005, comm. member), Marcela Zalamea (2005, comm. member), Sara Lopez

(2006, advisor), Jianhui Chen (2006, advisor), Wenting Feng (2007, advisor). Na Qiao (current, advisor), Zhiyue Yi (current, advisor), Noelia Aponte (current, advisor), Xiucheng Zeng (current, advisor)

**Undergraduate Research Assistants:** Over 30 undergraduate students have worked in my laboratory.

### GRANTS

- 2015-2016 Natural fire history, historical drought stress, and tree species composition in the Guayama subtropical dry forest of Puerto Rico. USDA-FS, \$50,757.00.
- 2014-2015 Natural fire history, historical drought stress, and tree species composition in the Guayama subtropical dry forest of Puerto Rico. USDA-FS, \$101,327. PI.
- 2009-2011 Regulation on lignin decomposition by the availability of soil labile organic carbon and nitrogen. NSFC RMB300,000. Co-PI.
- 2008-2011 Temperature sensitivity of soil CO<sub>2</sub> efflux in tropical rain forests and rubber plantations in Southeast Asia. APN, \$70,000. PI.
- 2006-2012 Long-term ecological research at Luquillo site. NSF, \$6,000,000. Co-Investigator.
- 2006-2009 Influence of rubber plantations on tropical stream ecosystems in Xishuangbanna. Chinese Academy of Sciences. RMB 500,000. PI.
- 2006-2006 Workshop on tropical land-use policy and ecological consequences. The Chinese Academy of Sciences. RMB 70,000. PI.
- 2005-2008 Mechanisms regulating transformations of soil labile organic carbon in subtropical evergreen forest of China. Natural Science Foundation of Yunnan. RMB 60,000. PI.
- 2005-2008 Competitive awards for field ecological studies at Ailaoshan Field Station. Xishuangbanna Tropical Botanical Garden, the Chinese Academy of Sciences. RMB 100,000. PI.
- 2003-2005 Long-term ecological research at Nanjenshan of Taiwan: Effect of monsoon wind on arthropods and plant litter decomposition. National Science Council of Taiwan, NT \$1,500,000. Co-PI.
- 2003-2004 Long-term ecological research at Nanjenshan of Taiwan: Effect of monsoon wind on soil microbial activity. National Science Council of Taiwan, NT \$700,000. Co-PI.
- 2002-2006 Long-term ecological research at Luquillo site. NSF, \$4,000,000. Co-Investigator.
- 2002-2005 Mechanisms controlling soil microbial growth and N retention in a subtropical evergreen forest of China. The Chinese Academy of Sciences, RMB 1,000,000.00. PI.
- 2002-2003 Developing a global decomposition model that includes soil biota as driving variables. National Science Council of Taiwan, NT \$900,000.00. PI.
- 2001-2002 Ground Water Discharge as Influenced by Tropical Land Use in Puerto Rico: Implications to the Global Carbon Cycling. NASA-UPR, \$25,000. PI.
- 2000-2002 Long-term ecological research at Luquillo site. NSF, \$2,000,000. Co-PI.
- 2000-2001 Tropical land use changes alter below- and above-ground carbon dioxide production. NASA-UPR, \$25,000. PI.
- 1999-2003 Ecosystem processes and tropical land use changes in Puerto Rico. NASA-IRA, \$30,000/year. Co-PI.
- 1998-2000 Carbon dynamics in riparian and upland areas in a tropical wet forest. USDA-FS, \$30,200. PI.

- 1995-1997 Earthworm and soil processes in North American ecosystems: A cross-site study. NSF, \$200,000.
- 1994-2000 Long-term ecological research at Luquillo site. NSF, \$6,000,000. Co-PI.
- 1994-1999 Land management in the tropics and its effects on the global environment. NASA-IRA, \$45,000/year. Co-PI.
- 1994-1997 Biodiversity and decomposition in mesic forests: An across-site experimental study of patterns and processes. NSF, \$200,000.
- 1993-1998 Ecological processes and patterns of biodiversity in tropical forests of Puerto Rico. NSF, \$22,000/year. Co-PI.

## PUBLICATIONS

### Journal Articles

1. Shi, L. L., L. Qiao, W. T. Feng, and **X. M. Zou**. In review. A Reversion of Latitudinal Diversity Gradient for Bacteria in Forest Soils.
2. Li, L. G., J. Vogel, Z. L. He, **X. M. Zou**, H. H. Ruan, W. Huang, J. S. Wang, T. S. Bianchi. 2016. Association of soil aggregation with the distribution and quality of organic carbon in soil along an elevation gradient on Wuyi Mountain in China. *Plos One* 11(3): e0150898. doi: 10.1371/journal.pone.0150898.
3. Montti, L., M. Ayup, R Aragón, W. L. Qi, H. H. Ruan, R. Fernández, H. R. Grau, and **X. M. Zou**. 2016. Herbivory and the success of *Ligustrum lucidum* (Aiton): evidence from a comparison between native and novel ranges. *Australian Journal of Botany* 64: 181–192.
4. Wang, X. L., X.L. Wang, W. X. Zhang, Y. H. Shao, T. Liu, L. X. Zhou, S. Z. Wan, X. Q. Rao, Z. A. Li, **X. M. Zou**, and S. L. Fu. 2016. Invariant community structure of soil bacteria between subtropical coniferous and broadleaved forests. *Scientific Report*, in press.
5. Shi, L. L., H. Z. Zhang, T. Liu, W. X. Zhang, Y. H. Shao, D. L. Ha, Y. Q. Li, C. M. Zhang, X. A. Cai, X. G. Rao, Y. B. Lin, L. X. Zhou, P. Zhao, Q. Ye, **X. M. Zou**, S. L. Fu. 2016. Consistent effects of canopy vs. understory nitrogen addition on the soil exchangeable cations and microbial community in two contrasting forests. *Science of the Total Environment* 553: 349–357.
6. Huang, W., W. H. McDowell, **X. M. Zou**, H. H. Ruan, J. S. Wang, Z. L. Ma. 2015. Qualitative differences in headwater stream dissolved organic matter and riparian water-extractable soil organic matter under four different vegetation types along an altitudinal gradient in the Wuyi Mountains of China. *Applied Geochemistry* 52: 67–75.
7. Shi, L. L., P. E. Mortimer, J. W. F. Slik, **X. M. Zou**, J. C. Xu, W. T. Feng, and L. Qiao. 2014. Variation in forest soil fungal diversity along a latitudinal gradient. *Fungal Diversity* 64: 305-315.
8. Qiao, N., D. A. Schaefer, E. Blagodatskaya, **X. M. Zou**, X. L. Xu, and Y. Kuzyakov. 2014. Labile carbon retention compensates for CO<sub>2</sub> released by priming in forest soils. *Global Change Biology* 20:1943-1954.
9. Qiao, L., D. A. Schafer, **X. M. Zou**. 2014. Variations in net litter nutrient input associated with tree species influence on soil nutrient contents in a subtropical evergreen broad-leaved forest. *Chinese Science Bulletin* 59: 46-53.

10. Xu, W. J., O. C. Chan, L. L. Shi, L. Li, P. Caspiter, and **X. M. Zou**. 2013. Assessing the effect of litter species on the dynamic of bacterial and fungal communities during leaf decomposition in microcosm by molecular techniques *PloS ONE* 8 (12): e84613.
11. Huang, W., W. H. McDowell, **X. M. Zou**, H. H. Ruan, J. S. Wang, and L. . Li. 2013. Dissolved organic carbon in headwater streams and riparian soil organic carbon along an altitudinal gradient in the Wuyi Mountains, China. *PloS ONE* 8(11): e78973.
12. Zhang, M., D. A. Schaefer, O. C. Chan, X. M. Zou. 2013. Decomposition differences of labile carbon from litter to soil in a tropical rain forest and rubber plantation of Xishuangbanna, southwest China. *European Journal of Soil Biology* 55: 55-61.
13. Feng, W. T., D. A. Schaefer, **X. M. Zou**, and M. Zhang. 2011. Shifting sources of soil labile organic carbon after termination of plant carbon inputs in a subtropical moist forest of southwest China. *Ecological Research* 26: 437-444.
14. Han, B., **X. M. Zou**, J. J. Kong, H. D. Gong, Z. Yu, T. Cao, L. Q. Sha. 2010. Nitrogen fixation of epiphytic plants enwrapping trees in Ailao Mountain cloud forests, Yunnan, China. *Protoplasma*, 247:103-110.
15. Zhang, M., D. A. Schaefer, and **X. M. Zou**. 2010. Alteration of soil labile organic carbon by invasive earthworms (*Pontoscolex corethrurus*) in tropical rubber plantations. *European Journal of Soil Biology* 46: 74-79.
16. Cao, Y. S., S. L. Fu, **X. M. Zou**, H. L. Cao, Y. H. Shao, L. X. Zhou. 2010. Soil microbial community composition under Eucalyptus plantations of different age in subtropical China. *European Journal of Soil Biology* 46: 128-135.
17. Zhang, M., and **X.M. Zou**. 2009. Comparison of soil C and N in rubber plantation and seasonal rain forest. *Chinese Journal of Applied Ecology* 20: 1013-1019.
18. Fu, S. L., **X. M. Zou**, D. C. Coleman. 2009. Highlights and perspectives of soil biology and ecology research in China. *Soil Biology and Biochemistry* 41: 868-876.
19. Schaefer, D. A., W. T. Feng, and **X. M. Zou**. 2009. Plant carbon inputs and environmental factors strongly affect soil respiration in a subtropical forest of southwestern China. *Soil Biology and Biochemistry* 41: 1000-1007.
20. Li, Y. J., X. D. Yang, **X. M. Zou**, and J. H. Wu. 2009. Response of soil nematode communities to tree girdling in a subtropical evergreen broad-leaved forest of southwest China. *Soil Biology and Biochemistry* 41: 877-882.
21. Feng, W. T., **X. M. Zou**, D. A. Schaefer. 2009. Above- and belowground carbon inputs affect seasonal variations of soil microbial biomass in a subtropical monsoon forest of southwest China. *Soil Biology and Biochemistry* 41: 978-983.
22. Feng, W. T., D. A. Schaefer, J. Z. Li, J. H. Chen, **X. M. Zou**. 2009. Soil mono- and disaccharides and amino acids as influenced by plant litter and root processes in a subtropical moist forest of Southwest China. *Biogeochemistry* 92: 119-128.
23. Feng, W. T., **X. M. Zou**, L. Q. Sha, J. H. Chen, Z. L. Feng, and J. Z. Li. 2008. Comparisons between seasonall and diurnal patterns of soil respiration in a montane evergreen broad-leaved forest of Ailao Mountains, China. *Journal of Plant Ecology* (Chinese) 32: 31-39.
24. Wall, D.H., M.A. Bradford, M.G. St John, J.A. Trofymow, V.I.E. Behan-Pelletier, D.D.E. Bignellk, J.M. Dangerfield, W.J. Parton, J. Rusek, W.D. Voigt, V. Wolters, H.Z. Gardel, F.O. Ayuke, R. Bashford, O. Beljakova, P.J. Bohlen, A. Brauman, S. Flemming, J.R. Henschel, D.L. Johnson, T.H. Jones, M. Kovarova, J.M.. Kranabetter, L. Kutny, K.-C. Lin, M.M. Dominique Masse, A. Pokarzhevskii, H. Rahman, M.G. Sabara, J.A. Salamon, M.J. Swift, A.

- Varela, H.L. Vasconcelos, D. White, **X.M. Zou**. 2008. Global decomposition experiment shows soil animal impacts on decomposition are climate-independent. *Global Change Biology* 14: 1-17.
25. Chan, O.C., P. Casper, L.Q. Sha, Z.L. Feng, Y. Fu, X.D. Yang, A. Ulrich, **X.M. Zou**. 2008. Vegetation cover of forest, shrub and pasture strongly influences soil bacterial community structure as revealed by 16S rRNA gene T-RFLP analysis. *FEMS Microbiology Ecology* 64: 449-458.
26. Zhang, M., X. H. Fu, W. T. Feng, and **X. M. Zou**. 2007. Soil organic carbon in pure rubber and tea-rubber plantations in southwestern China. *Tropical Ecology* 48: 201-208.
27. Yang, X. D., M. Warren, **X. M. Zou**. 2007. Fertilization responses of soil litter fauna and litter quantity, quality, and turnover in low and high elevation forests of Puerto Rico. *Applied Soil Ecology* 37: 63-71.
28. **Zou, X.M.**, B. Arandes-Pérez, D. Capó-Ramos, J. Gutiérrez-Santiago, and M. Rosario-Santiago. 2006. Comparisons of earthworm community structure between an active pasture and an adjacent tropical wet forest. *Caribbean Journal of Science* 42: 311-314.
29. González, G., E. Espinosa, Z. Liu, and **X. M. Zou**. 2006. A fluorescent marking and re-count technique using the invasive earthworm, *Pontoscolex corethrurus* (Annelida: Oligochaeta). *Caribbean Journal of Science* 42: 371-379.
30. Yang, X. D., and **X. M. Zou**. 2006. Soil fauna and leaf litter decomposition in tropical rain forest in Xishuangbanna, SW China: Effects of mesh size of litterbags. *Acta Ecologica Sinica*, 30 (5): 791-801.
31. Chan, O. C., X. D. Yang, Y. Fu, Z. L. Feng, L. Q. Sha, P. Casper, **X. M. Zou**. 2006. 16S rRNA gene analyses of bacterial community structures in the soils of evergreen broad-leaved forests in SW China. *FEMs Microbiology Ecology* 58: 247-259.
32. González, G., C. Y. Huang, **X. M. Zou**, and C. Rodriguez. 2006. Earthworm invasions in the tropics. *Biological Invasions* 8: 1247-1256.
33. Callaham, M. A., G. Gonzalez, C. H. Hale, L. Heneghan, S. L. Lachnicht, and **X. M. Zou**. 2006. Policy and management responses to earthworm invasion in North America. *Biological Invasions* 8: 1317-1329.
34. Hendrix, P.F., Baker, G.H., Callaham Jr., M.A., Damoff, G.A., Fragoso, C., González, G., James, S.W., **Zou, X.** 2006. Invasion of exotic earthworms into ecosystems inhabited by native earthworms. *Biological Invasions* 8: 1287-1300.
35. Chen, J. H., **X. M. Zou**, and X. D. Yang. 2006. Retention of plant available P in acid soils of tropical and subtropical evergreen broad-leaved forests. *Acta Ecologica Sinica* 26 (7): 2294-2300.
36. Li, Y., M. Xu, and **X. M. Zou**. 2006. Heterotrophic soil respiration in relation to environmental factors and microbial biomass in two tropical wet forests. *Plant and Soil* 281: 193-201.
37. Cao, M., **X. M. Zou**, M. Warren, H. Zhu. 2006. Introduction: The tropical forests in Xishuangbanna of China. *Biotropica* 38: 306-309.
38. Li, Y., M. Xu, and **X. M. Zou**. 2006. Effects of nutrient additions on ecosystem carbon cycle in a Puerto Rican tropical wet forest. *Global Change Biology* 12: 284-293.
39. Hou, P. L., **X. M. Zou**, C. Y. Huang, H. J. Chien. 2005. Plant litter decomposition influenced by soil fauna and disturbance in a subtropical rainforest of Taiwan. *Pedobiologia* 49: 539-547.

40. Ruan, H. H., Y. Li, and **X. M. Zou**. 2005. Soil communities and plant litter decomposition as influenced by forest debris: Variation across tropical riparian and upland sites. *Pedobiologia* 49: 529-538.
41. Dechaine, J., H. H. Ruan, Y. Sanchez, and **X. M. Zou**. 2005. Correlation between earthworms and plant litter decomposition in a tropical wet forest of Puerto Rico. *Pedobiologia* 49: 601-607.
42. **Zou, X. M.**, H. H. Ruan, Y. Fu, X. D. Yang, L. Q. Sha. 2005. Estimating soil labile organic carbon and turnover rates using a sequential fumigation-incubation procedure. *Soil Biology and Biochemistry* 37 (10): 1923-1928.
43. Li, Y., M. Xu, **X. M. Zou**, and Y. Xia. 2005. Soil respiration and fungal and bacterial biomass in a plantation and a secondary forest in Puerto Rico. *Plant and Soil* 268: 151-160.
44. Li, Y., H. H. Ruan, **X. M. Zou**, R. W. Myster. 2005. Tropical landslides illustrate relationships between biophysical factors and soil development in Puerto Rico. *Soil Science* 170 (3): 202-211.
45. Li, Y., M. Xu, **X. M. Zou**, and Y.Q. Zhang. 2005. Comparing soil organic carbon dynamics in plantation and secondary forest in wet tropics in Puerto Rico. *Global Change Biology* 11 (2): 239-248.
46. Han, B., A.G. Chen, **X.M. Zou**, and Y.N. Fu. 2004. A comprehensive evaluation on sustainable management of a mountain community: A case study on Daka village, Yunnan. *Acta Ecologica Sinica*, 24 (12): 2915-2919.
47. Sanchez, Y., and **X. M. Zou**. 2004. Plant influences on native and exotic earthworms during secondary succession in old tropical pastures. *Pedobiologia* 48: 215-226.
48. Ruan, H. H., **X. M. Zou**, F. N. Scatena, and J. K. Zimmerman. 2004. Asynchronous fluctuations of soil microbial biomass and plant litterfall in a tropical wet forest. *Plant and Soil* 260: 147-154.
49. Finical, L., J. Sharpe, and **X. M. Zou**. 2004. Influence of fertilization on fern community in a tropical wet forest. *Journal of Tropical Ecology* 20: 173-181.
50. Grau H. R., T. M. Aide, J. K. Zimmerman, J. R. Thomlinson, E. Helmer, **X. M. Zou**. 2003. The ecological consequences of socioeconomic and land use changes in post agriculture Puerto Rico. *BioScience* 53:1159-1168
51. Sanchez, Y., **X. M. Zou**, S. Borges, and H. H. Ruan. 2003. Recovery of native earthworms in abandoned tropical pastures. *Conservation Biology* 17: 999-1006.
52. Warren, M. and **X. M. Zou**. 2003. Nitrogen retention in temperate deciduous forests: the vernal dam hypothesis. *Acta Phytoecologica Sinica* 27: 11-15.
53. Lachnicht, S.L., P.F. Hendrix, and **X. M. Zou**. 2002. Interactive effects of native and exotic earthworms on resource use and nutrient mineralization in a tropical wet forest soil of Puerto Rico. *Biology and Fertility of Soils* 36: 43-52.
54. Warren, M., and **X. M. Zou**. 2002. Tree species effect on soil macrofauna in tropical tree plantations of Puerto Rico. *Forest Ecology and Management* 170: 161-171.
55. Liu, Z.G. and **X. M. Zou**. 2002. Exotic earthworms accelerate plant litter decomposition in a Puerto Rican pasture and a wet forest. *Ecological Applications* 12: 1406-1417.
56. Kaye, J., D. Binkley, **X. M. Zou**, and J. Parrota. 2002. Retention of nitrogen by N-fixing species in tropical tree plantations. *Soil Science Society of America Journal* 66: 612-619.
57. González, G., R. E. Ley, S. K. Schmidt, **X. M. Zou**, and T. R. Seastedt. 2001. Soil fauna and microbial interactions: comparisons between tropical and subalpine forests. *Oecologia* 128: 549-556.



58. **Zou, X. M.** 2001. Directing the Arctic water to northwestern China: A solution for controlling dust storms. *Chinese Journal of Ecology* 20(2). In Chinese.
59. • Hendrix, P. F., M. A. Callaham, Jr., S. L. Lachnicht, J. M. Blair, S. W. James, and **X. M. Zou**. 1999. Stable isotopic studies of resource utilization by earthworms in Apalachicola National Forest, USA. *Pedobiologia* 43: 818-823.
60. González, G. and **X. M. Zou**. 1999. Earthworm influence on N availability and the growth of *Cecropia schreberiana* in tropical pasture and forest soils. *Pedobiologia* 43: 824-829.
61. Heneghan, L., D.C. Coleman, D.A. Crossley, Jr., and **X. M. Zou**. 1999. Nitrogen dynamics in decomposing chestnut oak (*Quercus prinus* L.) in mesic temperate and tropical forests. *Applied Soil Ecology* 13: 169-175.
62. González, G. and **X. M. Zou**. 1999. Plant and litter influences on earthworm abundance and community structure in a tropical wet forest. *Biotropica* 31: 486-493.
63. Heneghan, L., D.C. Coleman, **X. M. Zou**, D.A. Crossley, Jr. and B. L. Haines. 1999. Soil microarthropod contributions to decomposition dynamics: tropical-temperate comparisons of a single substrate. *Ecology* 80: 1873-1882.
64. González, G., **X. M. Zou**, A. Sabat, and N. Fetcher. 1999. Earthworm abundance and distribution pattern in contrasting plant communities within a tropical wet forest. *Caribbean Journal of Science* 35: 93-100.
65. Hendrix, P.F., S.L. Lachnicht, M. A. Callaham Jr. and **X. M. Zou**. 1999. Stable Isotopic Studies of Earthworm Feeding Ecology in Tropical Ecosystems of Puerto Rico. *Rapid Communications in Mass Spectrometry* 13(13): 1295-1299.
66. Heneghan, L., D.C. Coleman, **X. M. Zou**, D.A. Crossley, Jr. and B. L. Haines. 1998. Soil microarthropod community structure and litter decomposition dynamics: A study of tropical and temperate sites. *Applied Soil Ecology* 9:33-38.
67. **Zou, X. M.** and M. Bashkin. 1998. Soil carbon accretion and earthworm recovery following revegetation in abandoned sugarcane fields. *Soil Biology and Biochemistry* 30:825-830.
68. **Zou, X. M.** and G. González. 1997. Changes in earthworm density and community structure during secondary succession in abandoned tropical pastures. *Soil Biology and Biochemistry* 29:627-629.
69. González, G., **X. M. Zou**, S. Borges. 1996. Earthworm abundance and species richness in abandoned tropical croplands: comparisons between tree plantations and secondary forests. *Pedobiologia* 40:385-391.
70. **Zou, X. M.**, C. Zucca, R. Waide, and W. McDowell. 1995. Longterm influence of deforestation on tree species composition and litter dynamics of a tropical rain forest in Puerto Rico. *Forest Ecology and Management* 78:147-157.
71. **Zou, X. M.**, D. Binkley and B. Caldwell. 1995. Effects of dinitrogen fixing trees on phosphorus biogeochemical cycling in contrasting forests. *Soil Science Society of America Journal* 59:1452-1458.
72. Mount, H., W. Lynn, R. Vick, B. Dubee, and **X. M. Zou**. 1994. Mapping a longterm ecological research area in Puerto Rico. *Soil Survey Horizons* 35:111-121.
73. **Zou, X. M.** 1993. Tree species effects on earthworm density in tropical tree plantations in Hawaii. *Biology and Fertility of Soils* 15:353-38.
74. **Zou, X. M.**, D. Binkley and K. Doxtader. 1992. A new method for estimating gross phosphorus mineralization and immobilization rates in soils. *Plant and Soil* 147:243-250.

75. **Zou, X. M.**, C. Theiss and B.V. Barnes. 1992. Pattern of Kirtland's Warbler occurrence in relation to the landscape structure of its summer habitat in northern Lower Michigan. *Landscape Ecology* 6:221231.
76. **Zou, X. M.**, D.W. Valentine, R.L. Sanford and D. Binkley. 1992. Resincore and buriedbag estimates of nitrogen transformations in Costa Rican lowland rainforests. *Plant and Soil* 139:275283.
77. **Zou, X. M.** and R.L. Sanford. 1990. Agroforestry systems in China: a survey and classification. *Agroforestry Systems* 11:8594.
78. **Zou, X. M.** and W.H. Wagner. 1988. A preliminary review of *Botrychium* in China. *American Fern Journal* 78:122135.
79. **Zou, X. M.** and H. Ruan. 1986. A survey of forest vegetation in Jiangshi, Fujian province. *Journal of Nanjing Forestry University* 13(3): 4465. In Chinese.

### Book Chapters

80. McDowell, W. H., Scatena F. N., Waide R. B., Brokaw N., Camilo G. R., Covich A. P., Crowl T. A., Gonzalez G., Greathouse E. A., Klawinski P. D., Lodge D. J., Lugo A. E., Pringle C. M., Richardson B. A., Richardson M. J., Schaefer D. A., Silver W. L., Thompson J., Vogt D. J., Vogt K. A., Willig M. R., Woolbright L. L., Zou X., & Zimmerman J. K. 2012. Geographic and Ecological Setting of the Luquillo Mountains. In: *A Caribbean Forest Tapestry: The Multidimensional Nature of Disturbance and Response*. Chapter 3, Pp 72-163. Brokaw, N., Crowl T. A., Lugo A. E., McDowel W. H., Scatena F. N., Waide R. B., & Willig M. R. (Editors). Oxford University Press, Oxford, England.
81. Brokaw N, Zimmerman, J. K., Willig, M. R., Camilo, G. R., Covich, A. P., Crowl, T. A., Fetcher, N., Haines, B. L., Lodge, D. J., Lugo, A. E., Myster, R. W., Pringle, C. M., Sharpe, J. M., Scatena, F. N., Schowalter, T. D., Silver, W. L., Thompson, J., Vogt, D. J., Vogt, K. A., Waide, R. B., Walker, L. R., Woolbright, L. L., Wunderle Jr., J. M., Zou, X. M. 2012. Response to disturbance. In: *A Caribbean Forest Tapestry: The Multidimensional Nature of Disturbance and Response*. Chapter 5, Pp 201-271. Brokaw, N., Crowl T. A., Lugo A. E., McDowel W. H., Scatena F. N., Waide R. B., & Willig M. R. (Editors). Oxford University Press, Oxford, England.
82. González, G., Y. Li, and X. Zou. 2007. Effects of post-hurricane fertilization and debris removal on earthworm abundance and biomass in subtropical forests in Puerto Rico. Pages 99-108. In: *Minhocas na America Latina: Biodiversidade e Ecologia*. George G. Brown and Carlos Fragoso (Eds). Londrina, EMBRAPA Soja.
83. **Zou, X. M.** and G. González. 2002. Earthworms in tropical tree plantations: Effects of management and relations with soil carbon and nutrient use efficiency. In: *Management of Tropical Plantation Forests and their Soil Litter System*. Chapter 11, page 289-301. M. V. Reddy (Editor). Science Publishers Inc., Enfield, NH, USA.
84. Camilo, G. R. and **X. M. Zou**. 2001. Soil fauna in managed forests: lessons from the Luquillo Experimental Forest, Puerto Rico. In: *The cutting edge: Conserving wildlife in logged tropical forest*. Chapter 13, page 289-303. R. A. Fimble, A. Grajal, and J. G. Robinson (Editors). Columbia University Press, New York.
85. Groffman, P., E. Holland, D. Myrold, P. Robertson, and **X. M. Zou**. 1999. Denitrification. In: *Standard soil methods for longterm ecological research*. Page 272-288. G.P. Robertson, D.C. Coleman, P. Sollins, and C. Bledsoe (Editors). Oxford University Press, Oxford, UK.

86. Tsegaye, T. D., T. L. Coleman, Z. N. Senwo, D. A. Schaefer, and **X. M. Zou**. 1998. Effect of land-use practice on soil moisture variability for soils covered with dense forest vegetation of Puerto Rico. In: *NASA University Research Center Technical Advances in Aeronautics, Space Sciences and Technology, Earth Systems Sciences, Global Hydrology, and Education*. Volume II, page 95101. T. L. Coleman, B. White, and S. Goodman (Editors). HSCaRS, Alabama A& M University, Normal, AL, USA.
87. Schaefer, D.A., T.M. Aide, J.D. Chinea, N. Fetcher, M. Keller, S. Molina, J.A. Molinelli, J. R. Thomlinson, G.A. Toranzos, R.B. Waide, B.R. Weiner, J.K. Zimmerman, and **X. M. Zou**. 1997. Land management in the tropics and its effects on global environment: the NASA institutional research award. In: *NASA ACE Center Series: Proceedings of the NASA University Research Center Technical Conference*. Volume I, page 665670. MJamshidi, R. Lumia, E. Tunstel, Jr., B. White, J. Malone, and P. Sakimoto (Editors). NASA ACE Center Press, Albuquerque, NM, USA.
88. **X. M. Zou**. 1995. Plant influence on phosphorus biogeochemical cycling. In: *Advances in soil and plant nutrition research*. Page 170-184. F.S. Zhang, Y.S. Gong, and X.L. Li (Editors). Chinese Agriculture Press, Beijing.
89. **X. M. Zou**. and D. Binkley. 1992. Effects of tree species biogeochemistry on soil fertility. In: *Advances in Modern Ecology*. Page 6572. J. Liu (Editor). Chinese Science and Technology Press, Beijing, China. In Chinese.

#### Books and Special Issues

90. Coleman, D. C., S. L. Fu, **X. M. Zou**. Special Issue Editors. 2009. Science Goes Underground in China. *Soil Biology and Biochemistry* 41: 867-1028.
91. **Zou, X. M.**, M. Cao, and M. Warren. Special Section Editors. 2006. The Xishuangbanna Tropical Forests in China. *Biotropica* 38: 306-347.
92. Soil Survey Staff (H. Mount, W. Lynn, R. Vick, B. Dube, **X. M. Zou** and J. Davis). 1995. Order 1 soil survey of the Luquillo longterm ecological research grid, Puerto Rico. USDANRCS, Lincoln, NE, USA.

#### Book Review

93. **X. M. Zou**. 1993. Hurricanes. *Forest Ecology and Management* 60:171172.