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- **Blogs (/blogs)**
- **Membership (/membership)**
- **AAAS News (/announcements)**
- **Events (/events)**

Home (/) > **Blogs (/blogs)** > **Member Spotlight (/blogs/Member%20Spotlight)** > Jack Liu tracks our ecological footprint

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Jack Liu tracks our ecological footprint

September 7, 2012 | Author:Rebecca Riffkin, AAAS MemberCentral Associate Editor

Jack Liu and his team at MSU have used Wolong Nature Reserve for panda conservation as a laboratory to generate ideas and methods that have been applied to regional, national, and global levels. (Image: Sue Nichols, Michigan State University)

Jianguo (Jack) Liu has spent his life looking at the complex interactions between humans and the environment. His work isn't contained to one field, instead he works holistically and across many disciplines. One area of interest, the impact of single households on the endangered panda.

He finds it important to follow the data beyond everything else, even when it leads you down paths you don't understand. Liu talked with AAAS MemberCentral about his work and many interesting findings.

AAAS MemberCentral: You have said before "I always try to let the data speak for itself." Can you elaborate? Why do you think following the data, even if it doesn't fit your expectations, is so important?
Jianguo (Jack) Liu, AAAS Fellow and Rachel Carson Chair in Sustainability & University Distinguished Professor at the Center for Systems Integration and Sustainability at Michigan State University: Following the data is essential for scientists and others to concentrate on facts and evidence, enhance their arguments, and minimize their personal biases. Data not only are the foundation for testing scientific hypotheses and theories, they also offer a common language for scientists and policy makers to talk about creating policies and management plans.

AAAS MC: Much of your work takes a holistic approach, looking at many seemingly unrelated factors and finding how they impact each other. Why did you get interested in this holistic work?
Liu: Filling important knowledge gaps is not only an exciting scientific endeavor, but also crucial to provide key information for policy making and management. So many questions cannot be answered by one field or discipline.

AAAS MC: A lot of your work has involved many different scientific fields, why do you think this cross-disciplinary work is so crucial?
Liu: Scientific and societal challenges such as biodiversity loss, ecosystem degradation, climate change, land use and land cover change involve multiple dimensions -- environmental, socioeconomic, political, cultural. No single discipline can understand and solve these challenges. For example, we found that panda habitat in a world-famous nature reserve was degrading faster after its establishment. Ecological theories and methods cannot explain this unexpected outcome. However, with socioeconomic and demographic analyses, we were able to understand this surprising phenomenon.

AAAS MC: Can you elaborate about your work with pandas and what you learned?
Liu: Our work with panda conservation focuses on complex interactions and feedbacks among pandas, people, and policies. People affect pandas and their habitat through activities such as timber harvesting and fuelwood

collection. When panda habitat conditions degrade, the government develops and implements new policies. These new policies affect human attitudes and behaviors, which in turn affect pandas and their habitat. Our international and interdisciplinary team has learned many important lessons. For the last 17 years, we have used Wolong Nature Reserve for panda conservation (which contains approximately 10% of the wild pandas and 5,000 farmers) as a laboratory to generate ideas and methods that have been applied to regional, national, and global levels. For example, our new methods of mapping panda habitat developed from Wolong have been applied to mapping panda habitat across its entire geographic range. Inspired by the finding that the number of households had grown much faster than population size in Wolong, we discovered similar patterns in 141 countries.

AAAS MC: Can you also explain your work on how divorce and changing household size can impact the environment?

Liu: Households are basic units for many socioeconomic activities, like resource consumption. Divorce splits a household into two, which double the requirements for housing units and associated household goods and products, such as furniture and appliances. Furthermore, in terms of the number of people in a household, each divorced household is smaller than the original married household. A smaller household is less efficient in terms of per capita resource use because many household items can be shared. Once a heater is turned on, it consumes basically the same amount of energy whether the household has two or three people. Of course, a smaller household can be formed for other reasons, such as empty-nesters (households in which children have moved out), and reduction in multi-generation households.

AAAS MC: What advice do you have for other young scientists who find themselves interested in many different aspects of different fields? How can they find and be successful in cross-disciplinary projects like you have?

Liu: Get trained in multiple disciplines; read publications in other disciplines; attend conferences and seminars unrelated to one's own fields; start with relatively small research projects that require multidisciplinary concepts, theories and methods; collaborate with natural and social scientists in many fields; be tolerant and patient as different fields have different cultures and traditions.

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- ## Categories

  - **Science Policy (227) (/categories/science-policy)**
  - **K-12 Education (91) (/categories/k-12-education)**
  - **Undergraduate Education (80) (/categories/undergraduate-education)**
  - **International Co-operation (68) (/categories/international-co-operation)**
  - **Human Rights (22) (/categories/human-rights)**
  - **Public Engagement (90) (/categories/public-engagement)**
  - **Evolution (52) (/categories/evolution)**
  - **Climate Change (58) (/categories/climate-change)**
  - **Energy (35) (/categories/Energy)**
  - **Medicine (126) (/categories/medicine)**
  - **Workforce Development (87) (/categories/workforce-development)**
  - **Career Development (89) (/categories/career-development)**
  - **Diversity (55) (/categories/diversity)**
  - **Communicating Science (129) (/categories/communicating-science)**
    Biology (120) (/categories/biology)
    Chemistry (21) (/categories/chemistry)
    Earth Sciences (12) (/categories/earth-sciences)
    Engineering (36) (/categories/engineering)
    Physics (32) (/categories/physics)
    Social Sciences (12) (/categories/social-sciences)

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