CHAPTER 18

Lessons from Local Studies for Global Sustainability

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18.1 Introduction

An important feature of a model system is that the results from the system can be applicable to many other systems (Chapter 2). However, unlike model organisms such as the fruit fly (*Drosophila melanogaster*) and model ecosystems (Chapter 2), model coupled human and natural systems are more complex because they consist of both natural and human components as well as their interactions. Thus, generalizable findings from model coupled systems are often more difficult to obtain.

Fortunately, our team's long-term research in the model coupled system of Wolong Nature Reserve has been fruitful. Our work in this real-world laboratory has produced ideas and methods for understanding how coupled systems work and what this might mean for sustainability in Wolong and beyond. Besides providing useful information for conservation and sustainability policy making, these ideas and methods have also contributed to existing theories. Examples include theories on complexity (An et al., 2005), social norms (Chen et al., 2009), collective action (Yang et al., 2013a), and forest transition (Viña et al., 2011). Our work in this model coupled system has also contributed to the development of new theories such as those about telecoupling (Liu, 2014, Liu et al., 2013a, 2014, 2015, Liu and Yang, 2013; Chapter 17).

In the past two decades, our team has also learned many lessons through research in Wolong and through applying some of the results from Wolong to other coupled systems worldwide, as illustrated in previous chapters. Here we highlight ten of them. It is our hope that these lessons may be useful for studying other coupled systems and for helping achieve global sustainability.

18.2 Insights from model coupled systems are applicable to other systems

It has been documented that some aspects of coupled systems are different at different scales (scale dependent; Cumming et al., 2006, Zurlini et al., 2006) and in different contexts (context dependent; Abel et al., 2006, McDaniels et al., 2008). However, our team's work indicates that there are also some features of coupled systems that are the same or similar at different scales (scale independent) and in different contexts (context independent), in addition to scale-dependent and context-dependent features. This demonstrates the utility of model coupled systems like Wolong. In other words, methods and findings from a model coupled system can be applicable to other systems, including those in which the focal system is embedded and those that are far away from the focal system.

For instance, our finding that the number of households increased faster than population size in Wolong (Figure 18.1A) led to the discovery of a similar pattern in 141 countries (Figure 18.1B). This

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multifaceted perspective of local residents in Wolong allowed us to better appreciate the difficulties that residents face and the diverse and dynamic factors (e.g., not only economic, but also cultural, social, and political) that they consider in making decisions. We also found that good intentions can sometimes lead to bad socioeconomic and environmental outcomes. It is essential to take a long-term approach to reveal complex attributes such as time lags, legacy effects, and feedbacks. Working with managers has given us an appreciation for the management problems they face and a platform from which to use our research to foster positive change. For example, we found that multiple interacting policies were needed to effectively manage human–nature interactions for sustainability. Other lessons include thinking "outside the box," diversifying the toolbox of ideas and approaches to meet complex challenges, and expecting the unexpected. We hope these lessons are useful for others undertaking the challenging, yet rewarding, task of conducting long-term, interdisciplinary research on coupled systems around the globe.

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