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Changing stakeholder relationships in nature reserve management: A case study on Snake Island-Laotie Mountain National Nature Reserve, Liaoning, China

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ABSTRACT

The number and total area of nature reserves in China has increased rapidly over the past couple of decades; however, the ability to effectively manage these reserves has not kept pace and conflicts between conservation efforts and economic development have emerged. The Snake Island-Laotie Mountain National Nature Reserve (SILMNNR) currently is experiencing the challenges of balancing conservation with local community development. This paper uses components analysis of human ecosystems (HEC) to examine conflicts arising from the management of the nature reserve and uses a stakeholder analysis to identify and better understand stakeholder inter-relationships in the SILMNNR-HEC. The goal of this study is to identify critical factors influencing stakeholder relationships in order to find ways of relieving conflicts between the reserve management and development. The stakeholder analysis revealed that the key stakeholders in the SILMNNR-HEC are natural resources, the Liaoning SILMNNR Authority, local residents, and enterprise developers; however, there was unequal power among stakeholders in the decision making process affecting the nature reserve. The paper evaluated the conditions and processes of SILMNNR-HEC through a framework of stakeholder relationships where critical factors, such as policy, finance, technology, and labor, and their respective strengths and feedbacks among stakeholders, were assessed and showed unequal flows of power among stakeholders. Two approaches are provided for transforming the unbalanced relationships into a stable and sustainable framework to sustainably manage the nature reserve: the first is by changing stakeholder relationships from opposition to cooperation; and the second by enhancing feedbacks and dynamics among stakeholders. The analysis used in this paper can be used as a model to assess conflicts around other protected areas in China and elsewhere.

1. Introduction

The number and total area of nature reserves in China has increased rapidly over the past couple of decades. The first nature reserve was established in 1956. By 1978, there were 34 nature reserves covering 126.5 × 10^4 ha in total area representing about 0.13 percent of China's total land area (Xue and Jiang, 1994). Today the number of nature reserves in all categories has increased to over 2500 coving more than 15% of China's land mass (Zhou and Grumbine, 2011). However, the ability to effectively manage nature reserves has not kept pace with their creation. Of particular concern in China is balancing conservation efforts with the needs of local people. Most of China's reserves are designed to protect biodiversity only and strict regulations greatly limit human activities in reserves; however, as many as 60 million people live in and around China's reserves many of whom depend on the resources within the reserve for their livelihoods (Zhou and Grumbine, 2011). As a result, many reserves are highly controversial and direct conflicts between local communities and reserves have arisen. Although, there are some instances where local communities have participated in the management and planning of nature reserves

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(Liu et al., 2008; Liu, 2011; Su, 2004), there is no tradition of citizen participation in governance in China and most nature reserves are managed top-down. Hence, conflicts between the conservation of natural resources and socioeconomic development in and around China's nature reserves remain an important issue that needs to be resolved (Fei, 2003; Luo, 2007; Zhuge et al., 2000).

In many parts of the world, there is now an emphasis on local involvement in park management to help resolve conflicts between parks and people (IUCN and Lewis, 1995; Warner, 1997). Humans are perceived as being integral components of ecosystems rather than separate entities to be excluded, as embodied in the concept of the "human ecosystem". The human ecosystem is defined as a "coherent system of biophysical and social factors capable of adaptation and sustainability over time, which includes critical resources and flows regulated by social system that can be described at several spatial and temporal scales that are hierarchically linked" (Force and Machlis, 1997; Machlis et al., 1997). More recently, the human ecosystem model has been incorporated into the concept of coupled human and natural system (CHANS) defined as systems in which human and natural components interact (Liu et al., 2007a, 2007b, 2007c).

This paper addresses conflicts in CHANS arising from the management of the Snake Island-Laotie Mountain National Nature Reserve (SILMNNR, UNESCO, 2013) in northeast China. Specifically, we report a stakeholder analysis that provides a better understanding of the inter-relationships that are influencing the reserve's conditions within its current operative framework and identifies critical factors that influence potential interactions needed to improve reserve management in the future. This analysis will not only prove useful to managers of the SILMNNR but will also be relevant to those faced with similar CHANS conflicts elsewhere.

2. Methodology

2.1. Stakeholder and analysis

The concept of "stakeholders" was first defined by Freeman (1984) as individuals and groups who are affected by decision-makers' decisions and actions and who have the power to influence their outcomes. Later, the definition was broadened to include any naturally occurring entity that is affected by organizational performance, meaning that it includes living and non-living entities and even mental-emotional constructs, such as respect for past generations or the wellbeing of future generations (Hubacek and Mauerhofer, 2008; Starik, 1995). As such, stakeholder analyses are conducted to better understand power dynamics and enhance the transparency and equality among stakeholders in the decision-making progress related to development projects (Reed et al., 2009).

Stakeholder analyses in development and natural resource management projects have often focused on inclusivity, being used to empower marginal groups (e.g., women), those without access to well established social networks, the under-privileged or the socially disadvantaged, and those who are not easily accessible (Johnson et al., 2004). Reed et al. (2009) defines stakeholder analysis as a process that: a) defines aspects of a social and natural phenomenon affected by a decision or action; b) identifies individuals, groups, and organizations who are affected by or can affect those parts of the phenomenon; and c) allows involvement by these individuals and groups in the decision-making process.

2.2. Study design

This study considers stakeholders of the SILMNNR to include living and non-living entities as research objects. First, we used a literature review, interviews, and field observations to develop detailed descriptions of stakeholders involved in conflicts between ecological conservation and socioeconomic development in the study area. We then analyzed relationships between stakeholders by mapping their respective levels of potential for conservation and influence, and inspecting their interest-influence linkages, which identifies their critical roles and other key factors and outlines the main problems and their causes. Consequently, this provides a practical application and evaluation of the human ecosystem framework at the scale of the nature reserve and its management process. Finally, by examining these conditions and processes we offer suggestions for changing key stakeholder relationships so that the reserve's current unstable framework could be transformed into a balanced and sustainable one.

2.3. Study site

The SILMNNR was established in 1980. It is located in Lvshunkou district in Dalian City, Liaoning Province, in northeast China (Fig. 1). It is composed of Snake Island (latitude38°56′28″–38°57′41″N,longitude 120°58′00″–120°59′15″E), which is 5.3 miles off shore, and Laotie Mountain (latitude 38°43′02″–38°57′16″N, longitude 121°04′53″–121°15′19″E). Snake Island is the only habitat worldwide for about 20,000 *Gloydius Shedaoensis* (GS), which is a poisonous snake categorized as crotalinae, serpent. Laotie Mountain is one of the most important avian stopovers on the East Asian migratory path (Zhang and Wen, 2006). Annually, about two-million birds stop on Snake Island to rest and feed (Li, 2005) in addition to those landing in and around reserve. A total of 307 bird species have been recorded, which includes 57 families of 19 orders. Nine of them are under first-class national protection, 46 are under second-class national protection, and 39 are raptors accounting for almost 48 percent of the national total. Laotie Mountain is also the home for many other animals and plants. Its forest coverage is about 35 percent. Hence, the SILMNNR has played a significant role in conservation and management of species and ecosystems since its establishment over 30 years ago.

The protection and management of the SILMNNR is based on the policies published by the Ministry of Environmental Protection, PRC (MEPPRC) and Dalian Municipal Government (DMG). The two policies are 'Regulations of the People's Republic of China on Nature Reserves' (published in 1994), which is China's first law regulating nature reserves issued by MEPPRC and still the only law for nature reserves, and 'Regulations of the Snake Island-Laotie Mountain National Nature Reserve' first published in 1997 and amended in 2009 by DMG, which establishes regulations regarding the construction and management of the reserve and punishment for illegal activities. In addition, there are specific laws and regulations published by MEPPRC related to this reserve, including 'Law of the People's Republic of China on Environmental Protection' (published in 1989), 'Law of the People's Republic of China on the Protection of Wildlife' (first issued in 1988 and amended in 2004), 'Regulations of the People's Republic of China on the Protection of Wild Vegetation' (published in 1997), and 'Forest Law of The People's Republic of China' (first published in 1984 and amended in 1998), which provide rules for the management of different natural resources, protection and legal responsibility. Thus, development and progress of the SILMNNR is under a series of comprehensive laws and regulations on nature reserves and natural resources.

3. Research

3.1. Conflicts in the Snake Island-Laotie Mountain National Nature Reserve

3.1.1. Scale and changes in functional zones

According to the policies and regulations promulgated by MEPPRC, three functional zones were designed for the SILMNNR in