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Regulatory frameworks for ecotourism: An application of Total Relationship Flow Management Theorems

Songjun Xu [a], Liang Mingzhu [a], Naipeng Bu [b], Steve Pan [c, *]

[a] Tourism Management Department, School of Management, Jinan University, 601 Huangpu Avenue West, Tianhe District, Guangzhou, 510632, China
[b] School of Hotel & Tourism Management, The Hong Kong Polytechnic University, 17 Science Museum Road, TST East, Kowloon, Hong Kong
[c] Cluster of Design and Specialised Businesses, Singapore Institute of Technology, 10 Dover Drive 138683, Singapore

HIGHLIGHTS

- Propose a Total Relationship Flow Management Theorems (TRFMTs) of Ecosystem.
- Develop a tourism impact regulatory mechanism design framework.
- Offer a theoretical foundation for regulating and controlling tourism impact and policy making.
- Congeal an elusive interactive relationship among ecotourism players.

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ABSTRACT

Based on a comparison of three approaches derived from total relationship flow management theorems, the paper describes a potential regulatory framework for eco-tourism at Wanlu Lake, Guangdong, China. It is argued that the nature of tourism's impacts is determined by the relationship flows and interactions between sub-systems of economics, natural environment and socio-cultural variables, and successful policy depends on the management of flows between these sub-systems within a coherent whole. The key features of the regulatory framework are described.

1. Introduction

Ecosystems, such as forest, wetland, ocean, and grassland, are considered vital and essential to the Earth because of their prominent ecological functions of biodiversity protection, carbon fixation, oxygen release, climate regulation, and environment depuration. (Bullock & Acreman, 2003; Li, Yang, Liu, & Zheng, 2014; Li, Yu, et al.,2014; Mitsch et al., 2013; Xie et al., 2010). Meanwhile, the socio-economic value of ecosystems for popular science education, employment, leisure, and tourism, is also drawing more attention worldwide (Sharma, Rasul, & Chettri, 2015). Consequently, the conservation and sustainable utilization of ecosystems is now a major concern for both the academia and practitioners. To strike a fine balance between economic development and environmental sustainability, China is now making great efforts on the comprehensive, coordinated, and sustainable development of ecosystems.

Ecotourism is one of the acceptable and sustainable approaches to ecosystem conservation and development. Because of its efficiency on environment protection and education, recreation, and job creation, ecotourism areas have become important tourist destinations (Bacon, 1987; Do, Kim, Kim, & Joo, 2015; Li & Han, 2001; Tao & Wall, 2009). However, with the rapid development and encroachment of mass tourism, ecosytem is facing negative tourism impacts. Behaviors such as pursuing economic benefits excessively, ignoring ecological sensitivity and vulnerability, or

* Corresponding author.
E-mail addresses: bluestone578@163.com (S. Xu), tmzliang@126.com (L. Mingzhu), tom.bu@connect.polyu.hk (N. Bu), steve.pan@singaporetech.edu.sg (S. Pan).

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excessive tourism development, have resulted in sharp decline in biodiversity and ecological area, destruction of resources, pollution of water and air, and change of landscape (Davenport & Davenport, 2006; Ning & He, 2007; Romeril, 1989; Saenz-de-Miera & Rosselló, 2014; Vaz, Walczynska, & Nijkamp, 2013; Zhong, Deng, Song, & Ding, 2011). On the other hand, uncoordinated development, overload of carrying capacity, and imbalance of stakeholders' interests may cause negative recreation impacts and community conflict (Bacon, 1987; Kim, Jun, Walker, & Drane, 2015; Mbaiwa, 2003). Thus, environmental, economic, and socio-cultural benefits cannot be realized. How to control negative and stimulate positive tourism impacts remains crucial for scholars and policy makers.

The purpose of this study is to innovatively apply Total Relationship Flow Management Theorems (TRFMTs) in the ecotourism setting and develop an ecotourism impact regulatory framework in the perspective of complex system. It provides a new insight on and approach to ecotourism impact regulation. This framework may help to achieve the sustainable ecotourism development and to strike a balance between environmental, economic, and socio-cultural benefits. The study first applies TRFMTs on ecotourism system and puts forward three theorems, called TRFMTs of Ecotourism System (TRFMTs-ES). It then utilizes TRFMTs-ES to analyze the relationships between ecotourism impacts and relationship flows. These flows include personnel flow, information flow, materials flow, and capital flow in ecotourism system. It attempts to identify the essence of ecotourism impact regulation and control. In so doing, an ecotourism impact regulatory framework (EIR-framework) is developed, aiming to offer a theoretical foundation for regulating and controlling ecotourism impacts. Lastly, Wanlu Lake, a well-known National Wetland Park in southern China, is utilized as an empirical case to demonstrate how the proposed framework can be applied for ecotourism development and conservation.

2. Literature review

2.1. Tourism impact

Tourism impact study has been drawing increasing attention because tourism development not only brings positive benefits, but also has a potential to exert negative influences (García, Vázquez, & Macías, 2015; Ko & Stewart, 2002; Lankford, 1994). Therefore, researches on negative tourism impact are important in comprehensive destination management (Ap & Crompton, 1998; Mathieson & Wall, 1982; Newsome, Smith, & Moore, 2008; Pizam, 1978; Stylidis, Biran, Sit, & Szivas, 2014), which helps to create theoretical foundation for tourism impact regulation and control. Tourism impact can be categorized as environmental, economic, and socio-cultural (Andereck, Valentine, Knopf, & Vogt, 2005; Gursoy & Rutherford, 2004; Gursoy, Jurowski, & Uysal, 2002; Zhong et al., 2011). Both positive and negative impacts were discussed in most studies.

Regarding environmental impacts, studies have highlighted positive impacts, such as providing capital for the conservation of natural resources, for improving surrounding environment and for environmental education (Andereck & Nyaupane, 2011; Andereck et al., 2005; Nyaupane & Poudel, 2011). Negative impacts were also studied from different perspectives. Some researches documented negative physical and ecological outcomes, such as air and water pollution, wastes emission, deforestation, and decline of biodiversity (Carić & Mackelworth, 2014; Collins-Kreiner, Malkinson, Labinger, & Shtainvarz, 2013; Li, Ge, & Liu, 2005; Naser, 2015). Some reported geographical problems, including landscape change, excessive urban sprawl, and overload of land carrying capacity (Vaz, 2016; Vaz, Nainggolan, Nijkamp, & Painho, 2011; Vaz et al., 2013).

As for economic impacts, researchers argued that community residents could benefit from more employment opportunities and an alternative source of income (Andereck & Nyaupane, 2011; Bestard & Nadal, 2007; Mbaiwa, 2011). In addition, the improvement of infrastructures and facilities may create a better living environment (Korça, 1996; Pratt, 2015). On the contrary, scholars also suggested that the seasonality of tourism and the possibility of increasing living cost may negatively affect residents' lives (Bestard & Nadal, 2007; McGehee & Andereck, 2004).

In terms of socio-cultural impacts, the previous studies mainly focused on the impact created by tourism on folk culture, customs, social life, beliefs and values of host communities (García et al., 2015). Some researchers concluded that tourism offered chances for leisure, social and cultural activities (Andereck & Nyaupane, 2011; Yoon, Gursoy, & Chen, 2001), arousing the awareness of preserving local historical buildings and sites (Oviedo-Garcia, Castellanos-Verdugo, & Martin-Ruiz, 2008). Cultural pride and community identity may be enhanced and formed as well (Besculides, Lee, & McCormick, 2002; Kim et al., 2015). Nevertheless, some studies emphasized that problems resulted from tourism development, such as traffic congestion, delinquency and vandalism, crime, drug use, prostitution, as well as social and cultural conflict, should not be overlooked (Andereck, Valentine, Vogt, & Knopf, 2007; Andereck et al., 2005; Park & Stokowski, 2009; Sharma, Dyer, Carter, & Gursoy, 2008).

Admittedly, existing studies have contributed a great deal to understanding tourism impacts and underpin the managerial theory. Nevertheless, they seldom use a systemic approach to analyze tourism impacts, even though tourism has long been regarded as a special system. Hence, this study tries to look into ecotourism impacts from the perspective of systemic analysis and complex system, attempting to offer a new insight into ecotourism impacts and their regulation and control.

2.2. Total Relationship Flow Management Theorems

TRFMTs, developed by Lin (Lin & Cheng, 2007; Lin & Sun, 2007; Lin, Cheng, Huang, Liang, & Zhao, 2013), are regarded as a theory, a concept, a tool, and an approach for systemic analysis that help to understand and manage relationship flows in systems. The theoretical foundation of TRFMTs is the structural theory of general systems (Lin & Wu, 1997a, 1997b; Lin, 1998a; Lin, 1998b). This theory has proven that, for any system, there are inherent relationships and laws between 1) the system structure and the behaviors and functions under the influence of an environment, and 2) the behaviors and functions of the system and the set of all its relationship flows. The principles and rules of TRFMTs can be mainly summarized as: for any system, the relationships between each part are constructed through a set of relationship flows inside the system (including personnel flow, information flow, materials flow, capital flow, energy flow, *et cetera*) and the system's input flow. All these flows are called the total relationship flow (TRF). Their interrelationships are collectively considered as the system structure. The essence of understanding and controlling the behaviors and functions of a system lies in understanding and controlling its TRF.

Currently, TRFMTs are mainly applied in organization studies. Cui and Wang (2014) combined TRFMTs and the structuration theory to analyze the influential mechanism of enterprise resource planning towards enterprise performance. Tan (2014) described the environment and the TRF of cloud manufacturing in the perspective of TRFMTs. Similarly, Zeng (2013) applied this approach to analyze and design a marketing knowledge management system of a company and presented a concrete construction scheme. Luo (2013) put forward an organizational structure model and