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Integrated Management Strategies Analysis of Marine Disaster Risk in China

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In this paper, we analyzed the data on marine disasters in Chinese coastal areas over twenty-four years from 1989 to 2012. According to the results of the analysis, the uncertainty degree of marine disaster hazards increased, and the exposure and vulnerability of coastal hazard bearing bodies also gradually increased. After 2000, the proportions of economic loss in the marine Gross Domestic Product (GDP) and national GDP were significantly reduced. Furthermore, for the establishment of an integrated risk management system in China, we proposed improvements in the following three areas: marine disaster risk awareness, quantitative analysis supporting technology, and decision optimization.

INTRODUCTION

The marine economy, especially the coastal zone economy, has been developing continuously at a high speed over the past twenty years in China. According to *China's Ocean Development Report* by the China Institute for Marine Affairs (2013), the marine economy will still maintain a high developing period over the next twenty years, and its contribution rate to the national economy will still improve stably. The specific weight of the marine domestic product share of the Gross Domestic Product (GDP) of China will reach 12.44%, 13.89%, and 15.49%, respectively, in 2020, 2025, and 2030. Chinese coastal areas have long coastlines, and the Pacific Ocean is the ocean with the most serious and frequent marine disasters. Chinese coastal areas along the Pacific Ocean are also highly risky areas with marine disasters. Since the 1980s, economic losses caused by marine disasters in Chinese coastal regions experienced an average annual growth of nearly 30%, which was higher than those caused by other natural disasters (United Nations, 2008; Zhang et al., 2011). Losses caused by marine disasters have a negative impact on marine economic development, and marine disasters can be considered to be a negative economic growth factor. In order to achieve sustainable development of the socio-economic system in coastal regions, it is necessary to pay much attention to potential threats from marine disasters and strengthen disaster risk management for avoiding or mitigating the adverse effects of marine disasters.

Disaster risk management refers to disaster management based on a full consideration of various risk uncertainties. It belongs to pre-disaster management. Risk management is focused on the inhibition roles of human activities during the formation of disasters (UN-ISDR, 2004; Shi, Zou, et al., 2005). The quantity, complexity, and other features of marine disasters indicate that it is necessary to implement integrated risk management. However, the study of disaster risk assessment and management started lately in China and was focused on terrestrial disasters. Since the United Nations started the International Decade for Natural Disaster Reduction (IDNDR) in 1989, integrated disaster reduction and risk management research has obtained appropriate attention (UN-ISDR, 2005; Shi et al., 2005). In 2001, the International Institute for Applied Systems Analysis (IIASA) in Austria and the Disaster Prevention Research Institute (DPRI) in Kyoto, Japan jointly proposed the International Society for Integrated Disaster Risk Management (IDRiM) and launched the IDRiM forum.

Over the past ten years, with the development of disaster research in China, it was believed that the previous disaster management was focused on the post-disaster management response and recovery measurements and that the guidance on risk prediction was not available. Therefore, post-disaster management was not an active prevention but a passive response. Disaster risk management was characterized by the prediction role, macroscopic measures, and diverse methods. Although disaster risk management was focused on the dynamic disaster development process rather than the final disaster products, disaster risk management can provide full protection for sustainable development. In disaster risk management, the management philosophy is converted from disaster mitigation to disaster risk reduction (Frans et al., 2006; Li and Wu, 2011; United Nations, 2010). However, the studies of marine disaster risks were fewer than the studies of terrestrial disaster risks. The shortcomings of the integrated risk management of marine disasters have become the bottleneck of marine disaster prevention and reduction in China (Zhang et al., 2011). In our paper, we discuss the variation features of the major marine disaster risks and the deficiencies in the integrated risk management of Chinese marine disasters over the past 24 years and propose improvements in the following three areas for the establishment of the integrated risk management system: marine disaster risk awareness, quantitative analysis supporting technology, and decision optimization.

DATA AND MATERIALS

According to the theory of the regional natural disaster system, the marine disaster system is a complex system composed of the hazard-inducing environment, marine hazard factors, and hazard bearing bodies such as coastal community economies.

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KEY WORDS: Marine disasters, hazard bearing body, economic losses, integrated risk management, risk awareness, decision optimization.