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Process-based environmental communication and conflict mitigation during sudden pollution accidents

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ABSTRACT

In this paper we examine process-based environmental communication and environmental appeals by stakeholders following the Zijin Pollution Accident in China, focusing on environmental conflicts mitigation. Logistic regression analysis of field survey data and process-based pollution investigation reveal that greater awareness and inadequate perceptions among respondents do not imply active environmental actions. Diverse demographic characteristics, such as occupation, income, education level and gender, were closely associated with interviewees' environmental responses. The pollution process-pattern-value-response chains can be deduced from downstream pollution diffusions and related information spreading. A process-based environmental communication framework, which encompasses process-, pattern-, value- and response-oriented pollution control and conflicts alleviation strategies, has been established to response to sudden pollution accidents. The information gathered in this study could be incorporated into local decision-making, and is of vital importance to help to alleviate environmental conflicts following sudden pollution accidents.

1. Introduction

The question of how to improve social welfare while achieving industrial development is a key challenge for regional sustainability (Charron, 2012). Studies in many countries have shown that sudden environmental accidents often create environmental conflicts which must be managed by local authorities (Wackernagel et al., 2002; Zhang et al., 2011b). Successful alleviation of these conflicts will result in better health outcomes and development which is environmentally, socially and economically sustainable (Charron, 2012; Waltner-Toews, 2004; Zhu et al., 2007).

Sudden environmental pollution accidents, such as those resulting from failure to contain mining wastes, often occur in upstream watersheds, and the intensity of the resulting survival and health crisis will vary in different locations (Anand et al., 2006; Betancourt et al., 2005; Charron, 2012; Gupta et al., 2002; Hou and Zhang, 2009; Lahr and Kooistra, 2010; Parkes et al., 2010; Wang et al., 1995; Yang et al., 2012). Such accidents may lead to extensive stakeholder conflicts, with environmental appeals being resisted by economic interests. Stakeholder groups therefore interact in a environmental goods game (Perc et al., 2013; Yang et al., 2014). Stakeholders' needs, aspirations and attitudes should all be taken into account during environmental decision-making (Wakefield et al., 2006; Zhang et al., 2013; Yang et al., 2013), though there are practical limits resulting from knowledge gaps and incompatible conflicts (Charron, 2012). Unfortunately, emergency management of sudden pollution accidents has often marginalized local people's benefits and paid little attention to achieving local participation (Charron, 2012; Liu et al., 2012; Song, 2008).

There is growing empirical evidence that incorporating stakeholders' appeals into the decision-making process is a crucial step in the mitigation of environmental conflicts (Burger, 2002; Song, 2008; Takshe et al., 2010). The involvement of environmental stakeholders can contribute to poverty alleviation, improved public

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health and reduced environmental conflicts (Cook, 2007). However, many demographic factors (such as age, education level, gender, occupation, residential location and income) can significantly shape the environmental attitudes of stakeholders (Dong et al., 2011; Qu et al., 2009; Song, 2008; Wakefield et al., 2006), and the perception and communication of information about environmental risks plays an important role in environmental knowledge translation (Lahr and Kooistra, 2010; Pablos-Mendez et al., 2005; Xia et al., 2012). Some studies have found that the details of perceived pollution and the social context may affect the environmental actions which are taken (Rooij, 2010; Slovic, 1997; Tilt, 2010).

The literature on environmental accidents has tended to focus on natural factors, such as toxicological effects (Lei et al., 2008), treatment technologies (Zhang et al., 2011b), and temporal–spatial water quality simulation (Zhang et al., 2011a), while paying less attention to social aspects. Some environmental response frameworks have addressed health, environment and development issues, e.g. the risk-based early warning model (Grayman and Males, 2002), the stochastic process model (Gottinger, 1998), the watershed governance prism framework (Parkes et al., 2010), the public good game (Perc et al., 2013), and the butterfly model of health (VanLeeuwen et al., 1999). However, these frameworks do not meet the need to make links between interacting social, economic, and environmental processes, and there are few reports of public involvement in process-based emergency management of sudden pollution accidents (Holdaway, 2010; Song, 2008).

Involving stakeholders in all phases of environmental decision-making can help to develop appropriate strategies in response to various environmental appeals. This requires analysis of the process of pollution diffusions into the downstream space, where this information is available. In this paper, the Zijin Pollution Accident (ZPA) was used as a case study to research environmental communication and public involvement in emergency management. The objectives of this study were: (1) to examine divergences in stakeholders' environmental awareness/perceptions and actions toward the ZPA and mining development; (2) to propose a process-based environmental communication framework; and (3) to discuss public involvement in spatial process-based pollution diffusions for alleviating environmental conflicts.

2. Process-based environmental communication framework

Many environmental risk mitigation-oriented models, e.g., the emergency response framework for drinking water treatment (Zhang et al., 2011b), the risk-based early warning model (Grayman and Males, 2002) and the butterfly model of health (VanLeeuwen et al., 1999), have established to response to environmental accidents. However, an unequal emphasis has been put on the objective or subjective aspects of pollution accidents in these models. The involvement of stakeholders, especially local sufferers and vulnerable groups, receives insufficient respect. Thus, we propose the process-pattern-value-response environmental communication framework for sudden pollution incidents shown in Fig. 1, which presents a comprehensive picture of the objective and subjective factors that potentially influence environmental communication.

The framework combines the objective pollution level and the subjective pollution perceptions with corresponding pollution mitigation policy based on the process-pattern-value-response chain. In this framework, objective perception of pollution diffusions and subjective pollution information spreading require immediate process-based environmental communication and pollution control. An intensive involvement of stakeholders in process-pattern-value-response chain, which has been a long-time neglect in Chinese backgrounds, could foster rational environmental response. The subsequent attempts to interpret public response and involvement in a sudden pollution incident can be seen as a miniature through which effective environmental communication can be explored beyond China's case.

3. Case study

The Zijin Pollution Accident, one of the greatest public environmental hazard incidents incidents in China in 2010, occurred at the Zijin Mining copper plant on July 12, 2010 in Shanghang County, Fujian Province, southeast China (see Fig. 2). The accident was caused by an illegal leakage of acidic, copper-contaminated water into the Tingjiang River, and was not immediately detected by monitoring equipment, which was later found to be defective (Xinhua News Agency, 2010a). As a result, approximately 9100 cubic meters of contaminated water was released into Tingjiang River, which is one of the largest rivers in Fujian and Guangdong Province, and a very important source of drinking water.

Subsequently, the leakage led to the poisoning of up to 1890 tons of fish (CIIC, 2010), and there was widespread panic among local people. People were concerned about waterway pollution and healthy risks in Tingjiang River, and some were afraid of possible contamination of drinking water supplied from Guanzhuang Reservoir in Shanghang County, Mianhuatan Reservoir in Yongding County and Qingxi Reservoir in Dapu County. At least

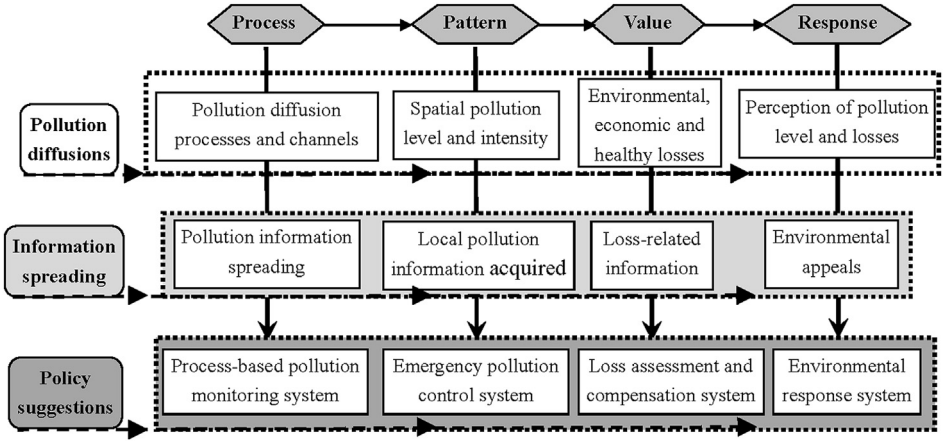

Fig. 1. The process-pattern-value-response environmental communication framework.