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Dealing with socioeconomic and climate-related uncertainty in small-scale salt producers in rural Sampang, Indonesia

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ABSTRACT

In this study, we aimed to investigate the uncertainty events affecting small-scale salt producers and find out how small-scale salt producers were responding to the combinations of climatic and socioeconomic uncertainty they had experienced. We divided the salt producers into three categories based on land ownership: (1) land owner; (2) wage laborer; and (3) tenant. We examine their perceptions of the problems and their adaptive responses at the household and aggregate levels. Based on fieldwork in salt production areas in rural Sampang, Indonesia. First, we find that the effect of uncertainty events does affect salt producers unequally. This, depending on resources and power within the community. Second, there are advantages and disadvantages of each adaptation. This is representing dilemma of salt producers that shape how adaptation practices are negotiated in order to respond the combinations of climatic and socioeconomic uncertainty. Finally, our finding underlines the challenges of developing an integrated approach to mitigating these uncertainty events.

1. Introduction

Small-scale salt producers in Sampang, Indonesia have been experiencing unusual extreme weather, volatile price and ambiguity regulation in their everyday life. In 2013, at least 2950 metric tons of salt were flooded with water because of rain just before harvesting time (BPBD, 2013). In the peak harvest period of 2015, the local price of salt has been dropping because of an abundance of imported salt that had been entering the country during the peak harvest period. Salt prices fell to Rp. 200 per kg from the break-even fair price of Rp. 500 to Rp. 600 per kg (The Jakarta Post, 2015). More and more, salt production decline by 70 percent because of *La Niña* and an influx of imported salt in August 2016 (The Jakarta Post, 2016). Successive years of poor or unstable prices and damaging weather combined to pose multiple challenges for salt farmers, who faced the question of how to adapt given uncertainty about future impacts from climatic and socioeconomic variability.

In this study, we aimed to investigate the uncertainty events affecting salt producers and find out how small-scale salt producers were responding to the combinations of climatic and socioeconomic shocks they had experienced in the context of rural Sampang, Indonesia. We examine their perceptions of the problems and their adaptive responses at the household and aggregate levels. We believed that perceptions would be critical in shaping small-scale salt producers' adaptive responses to the stresses outside their previous experiences (see Deressa et al., 2011; Hassan and Nhemachena, 2008).

Similar to other decision-makers, salt producers operate with an expectation of some degree of variability in the climatic conditions for production, and typically have developed a number of strategies to cope with such annual and inter-annual variability (see summary in Agrawal et al., 2008). Nevertheless, climate change may generate changes in production conditions, causing more variable conditions that may begin to exceed the limits of farmers' coping strategies (Smit et al., 2000). If farmers perceive an event as highly anomalous, it may be sufficient to convince them that conditions are changing beyond the bounds of normal variation, and motivate adaptive changes.

Similarly, the risks entailed in engaging in commercial markets may be familiar to salt producers who have traditionally produced salt for domestic markets. However, farmers' exposure to market risks is heavily influenced by the institutional context of production, and often in ways unanticipated by farm households (Eakin, 2000; Leichenko & O'Brien, 2008). Abrupt changes in market conditions and policy may also represent shocks to farmers' livelihoods, compelling changes in strategy, as well as affecting farmers' capacities to engage in traditional climate risk management practices.

Although uncertainty events have not been well documented, resource-dependent communities such as salt producers are the most vulnerable to the impact of these phenomena. Given the lack of

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resources and access to technology and finances, small-scale salt producers have limited capacity to develop adaptation strategies to reduce their vulnerability to uncertainty events (Mehar et al., 2016). Consequently, most of them live on the edge of extreme uncertainty, sometimes falling just below and sometimes rising just above the threshold of survival. More and more, adaptive responses will be required to cope with a plethora of similar hazards arising as a result of global environmental change (McLean et al., 2001). This makes them an important focus for adaptation research.

The literature of adaptation and vulnerability revealed to be a key concept in explaining the societal implications of uncertainty events (Füssel and Klein, 2006; Manyena, 2006). However, vulnerability and adaptation strategies to uncertainty events are usually inversely related to people's ability to access resources, assets, and means of protection. Those with limited access to resources usually bear a huge burden of impacts compare to rich people whose ability to respond is high and may be timely in the presence of early warning systems (Brooks et al., 2005). On the other hand, poor people are considered more exposed to it and respond late to it. This, however, depends on many other factors such as context, age, women, gender identity, and people with disabilities, ethnicity and income level (Pelling and High, 2005; Adger et al., 2007; Adger and Jordan, 2009). Vulnerability thus reflects how power and wealth are shared within society and traces its roots to cultural, social, economic and political structures, which lie beyond the reach of those who are poor and are comparatively more vulnerable (Blaikie et al., 2005; Brooks et al., 2005). Understanding people's adaptation to climatic and socioeconomic uncertainty through the lens of their vulnerability, therefore, requires detailed studies relying upon qualitative and quantitative research methods to better reflect the unique realities of people's everyday lives. Exploring those is this paper's focus of study.

Evidence from other countries suggests that a better understanding of how farmers perceive uncertainty events and the adaptation strategies they practice is needed to make policies and design programs aimed at promoting successful adaptation in the agricultural sector (Deressa et al., 2009; Hassan and Nhemachena, 2008; Kesa and Fraiture, 2016). Understanding the uncertainty event and their responses are also crucial to understanding and drawing a roadmap for future strategies to help the small-scale salt producers cope and manage risks from the policy standpoint. In many OECD countries, policymakers are increasingly seeking to support the resilience of communities and are indicating a need to increase self-reliance and sustainability at the community level (OECD, 2014).

In Indonesia, current national programs for enhancing the capacity of salt producers' communities to cope with socioeconomic and climate-related risks and to adapt in response to them have received relatively little attention. Programs for developing and disseminating weather forecasts are limited, while long-term programs for addressing climate variability and climate change have not been well developed (Kurniawan and Azizi, 2012; Kesa and Fraiture, 2016).

Effective policies and programs to address small-scale salt producers' ability to cope and recover from uncertainty events are necessary. To be effective, these programs need to be aligned with small-scale salt producers' views. Hence, this paper provides detailed evidence at the salt producers' level (bottom–up) and discussion to highlight the factual situation of salt producers and their decision environment.

2. Study area

This study was conducted in rural Sampang of Madura Island, the second largest salt production area in Indonesia. Sampang is located between 113° 08′ and 113° 39′ East and 06° 05′ and 07° 13' South in East Java Province, Indonesia (Fig. 1). Sampang produces 14% of total domestic salt production from 4624 ha of salt pans. The salt pans are divided into a 3396-ha area (73%) owned by individuals and a 1228-ha (27%) owned by the state-owned enterprise (KKP, 2015).

Evaporative salt production in rural Sampang occurs during the dry seasons, namely July to October. The production season begins during the southeast monsoon, as salt producers begin collecting seawater in June, July or August. They harvest salt for the first time in August, September or October. The timing of the process depends heavily on weather, as rain lowers salinity and clouds retard evaporation.

The highest rainfall occurs in January and December while August and September have the lowest rainfall in Sampang. Sampang has a very hot and arid climate in summer with a maximum temperature recorded of 34 °C and minimum temperature recorded of 29 °C. On average, the district receives an annual rainfall of 918 mm (BPS-Statistics Sampang, 2016).

Sampang was selected for this case study because most the people perform salt farming as their main livelihood and, at the same time, are the most vulnerable to the vagaries of climate, with high dependence on sunshine and elevated poverty levels. As pointed out by Lund (2014), we believe the case study will provide in-depth analysis of the adaptation strategies in small-scale salt producers.

3. Small-scale salt producers

Salt production has played an irreplaceable role in the lives of Sampang people. Salt making process is simple but extremely laborious. Based on data from the Department of Marine and Fisheries Sampang, in 2011 at least there are approximately 1201 people who are involved in salt business activities in Sampang Regency. In addition, as many as 12,738 people become the tenant of community salt ponds who does not own land (DKP Sampang, 2011). During harvest time, the number of tenants will be increased sharply to assist the process of harvesting, transporting and distribution of salt.

In Indonesian, particularly in Sampang, salt producers are dominated by small-scale salt producers. As can be seen in Table 1, small-scale salt producers contribute to the total salt production more than 80%. This is indicating how important small-scale salt production in terms of national salt supply.

Small-scale farms have figured prominently in the discourse about agricultural development, but definitions are often unclear. Hazell and Rahman (2014) pointed out that the terms smallholder or small farms pay attention to farm size, often denoting those farms that are less than 2 ha in extent. Holding size is perhaps the most direct and easily introduced indicator of who small-scale salt producers are. However, size is not a good criterion for defining small farms. Further, Rigg et al. (2016) pointed out that "… *even quite large holdings, made even larger by the opportunities afforded by mechanization, may be family-owned and operated; and that smallholders need not be a subordinate class so that size cannot be used as a simple proxy for subordination*". Thus, in this study, small-scale salt producers are defined as those producing raw or non-iodized salt on limited land areas. Indeed, they are often defined by their association with risk, vulnerability, marginalization, and exploitation (Adger et al., 2005; Rochwulaningsih and Sejaragh, 2017; Bacon, 2005). All of them suffer, in varying degrees, similar problems associated with isolation and low levels of technology, but also unpredictable exposure to world markets (Morton, 2007).

We divided the salt producers into three categories based on land ownership: (1) land owner; (2) wage laborer; and (3) tenant. The term "land owner" refers to a person who owns a salt field. "Wage laborer" refers to a worker who sells his or her labor under a formal or informal employment contract to produce salt. "Tenant" refers to a person whom a land owner allows to use the land (salt field) in return for a share of the salt produced on this portion of land. Land owners are the smallest group, but they earn the most money from the salt farms. In contrast, tenants are the largest group, but they receive less than half of the total earnings.

There are three grades of salt: (i) high grade (salt should be contained at least 97% of NaCl, pure white color, free of sand and mud); (ii) medium grade (salt should be contained at least 94.7%–97% of NaCl,