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Ensuring community and agricultural resiliency to climate change: Ceremonial practices as emic adaptive strategies

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Abstract

This paper is an analysis of emic versus etic approaches to climate change resiliency, taking as a case study the traditional ceremony performed by farmers in eastern Flores, Indonesia to rid their fields of rats. This paper begins by providing a theoretical framework discussion on the dominant etic and emic academic research on monsoons and climate change impacts on agriculture. The rat ceremony performed in villages throughout East Flores is a local custom used to rid agricultural fields of pests—often rats—that come from the surrounding forests to feed on the agricultural crops when the rains become erratic. This paper argues that analyzing the rat ceremony through an emic lens allows for better future resiliency to monsoon shifts due to climate change. It is argued that the rat ceremony demonstrates a way in which community resiliency is strengthened by an adaptive approach that supports an already existing community ceremony that emphasizes two essential tenets: community solidarity and coexistence with nature. Both tenets directly promote community resiliency. An explicit emphasis on emic approaches to climate change challenges could help re-define how resiliency is understood and supported within vulnerable communities such as rural villages.

Introduction

Climate change presents a multitude of problems for societies, institutions and individuals alike. Climate change, caused by dramatic increases in anthropogenic greenhouse gas emissions in the atmosphere, has the potential to disrupt the lives of all. From extreme storms to rising sea levels to massive droughts to desertification, climate change will likely create massive environmental uncertainty. Floods and droughts threaten the ability of farmers to produce stable crop yields. Unstable crop yields present major problems to farmers, through famine and lost income, and to policymakers, through food price volatility.

After the mining sector, agriculture is the most important economic sector to the Indonesian GDP (World Bank et al., 2013). The Indonesian Country Assessment report believes that natural hazards, specifically floods and droughts, are most threatening to the agricultural sector. It argues that damages within the agricultural sector threaten the stability of other economic sectors by potentially causing perturbation in the supply of food, goods and services. There is little groundwater potential for agricultural irrigation within Indonesia (World Bank et al., 2013, p. 27), so erratic rainfall from the Australian-Indonesian monsoon has the potential to not only threaten the agricultural sector with behavioral extremes, but it also controls the very existence of the sector. Monsoon rainfall and surface water (supplied directly by rainfall) allow agriculture to exist within Indonesia. As such, disaster response, especially disasters attributed to climate change, has become an important agenda point for policymakers. Within Indonesia and the region of Southeast Asia, weather and climate-related disasters are an increasing focus of regional policymakers and in-

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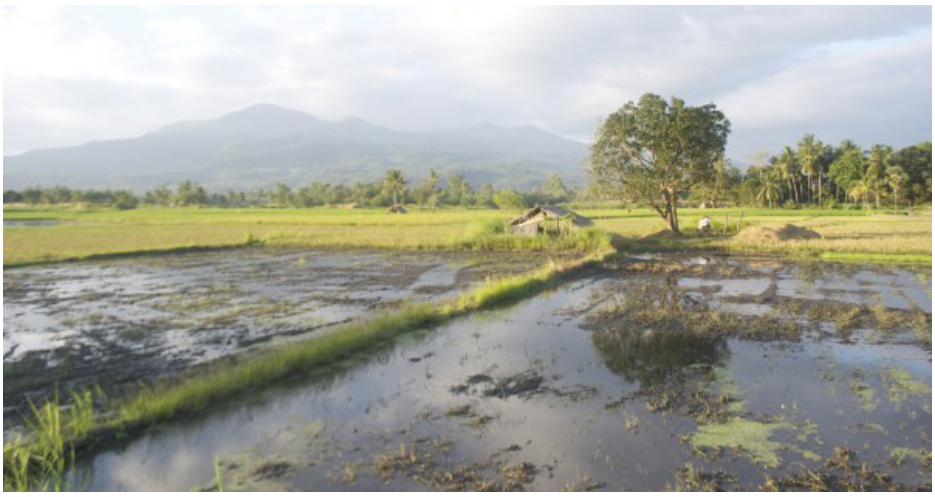

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Figure 1 : A Paddy field: the islands of East Flores, Indonesia, are especially vulnerable to monsoon shifts.

ternational organizations. Both see hydrometeorological services as highly important to economic activity and directly impacted by future disasters, especially those related to climate change.

Climate change and a lack of predators have destabilized pest populations within Indonesia (Dawei & Stigter, 2010; Rickards & Howden, 2012; Rodima-Taylor, Olwig & Chhetri, 2012). As climate change becomes an increasing presence around the world, many predict an increased pest problem within agriculture because of disrupted monsoon patterns (Behera et al., 2013; Dawei & Stigter, 2010; Howden, 2007; Huda et al., 2007; Rathore & Stigter, 2007; Rickards & Howden, 2012; Strand, 2000; Vermeulen et al,. 2010). Pest management within Indonesia focuses largely on controlling rat populations (Hidup, 2007; Soejitno, 1999; Thorburn, 2014). Within Indonesia, rats as pests are conceptualized as a serious threat to food security in regions already facing food scarcity (Hidup, 2007). Much of the social science research within Indonesia focuses on the history and social life of the many cultures within the country (Allerton, 2003; Barnes, 1974; Bubandt, 2004; Fox, 2011; Hägerdal, 2010), but none has looked at the relationship between the monsoon, climate change, pests and culture (**Figure 1**).

This paper is an analysis of emic versus etic approaches to climate change resiliency, taking as a case study the traditional ceremony performed by farmers in eastern Flores to rid their fields of rats. This paper begins by providing a theoretical framework discussion on the dominant etic and emic academic research on monsoons and climate change impacts on agriculture. The rat ceremony performed in villages throughout East Flores, Indonesia is a local custom (described further in the case study below) used to rid agricultural fields of pests—often rats—that come from the surrounding forests to feed on the agricultural crops when the rains become erratic. This paper argues that conceptualized as an emic strategy, the rat ceremony can be understood to support improved future resiliency to monsoon shifts due to climate change. While the national-level Indonesian government has a vested economic and political interest in maintaining control of the rat population through pesticides and defining rats as pests, the rat ceremony offers a worldview that sees rats as misguided friends, not enemies. The paper concludes with the argument that while an etic approach would be to continue heavy pesticide use, an emic approach would incorporate the rat ceremony and understand the multiple benefits it brings to the communities employing it.

Research methods for this study include participant observation in East Flores in May to August of 2014 for the author's Master Thesis at the Yale School of Forestry and Environmental Studies. Research focused on both agricultural practices and everyday social conversation about weather, in-depth ethnographic interviews in Bahasa Indonesia (the common language of Indonesia, a country with over 300 languages spoken), review of historical regional documents concerning monsoons, review of local government records of past weather, and probability sampling surveys of crop preferences during specific seasons and rain patterns. This research focused on how Indonesian villages are actively adjusting their crop choices given their ethnoclimatological worldview, focusing on local discourse about interactions with the environment in light of climate change.

Theoretical Framework

Emic and etic are two terms developed historically in anthropological theory as ways to distinguish between conceptual terms of analysis. While both are useful for

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analyzing local knowledge, etic approaches are often prioritized within the climate change adaptation literature. These etic approaches typically employ quantitative measurements of livelihoods to understand how best to create resiliency in communities vulnerable to the challenges presented by climate change. In contrast, the rat ceremony performed by farmers in villages throughout East Flores, Indonesia, provides an example of an emic approach to climate change adaptation—one drawing insight from the perspective of the farmers themselves. This theoretical framework section will focus on examining the climate change and agriculture literature on Indonesia, examining both etic and emic approaches.

As discussed below, research studies that utilize only etic approaches to climate change adaptation often rely upon quantitative measurements that make sense to those outside the community affected by changing climate. Such etic approaches often suggest economic and technological solutions to address climate vulnerabilities in Indonesian communities (Birkenholtz, 2011; Bussey et al., 2012; Challinor et al., 2014; Howden et al., 2007; Fujisaka et al., 1993; Keil et al., 2008; Stigter, 2008). External standards are measured to determine the successfulness of farmers' agricultural methods (Naylor et al., 2002; Salinger, Sivakumar & Motha, 2005). Research on Indonesian agriculture and climate change often focuses on quantitatively measuring adaptation as a means to aid vulnerable groups. The rationale is strong: "there is evidence that, in concert with global warming, the frequency and severity of extreme climatic events will increase during the twenty-first century, and the impacts of these changes will notably hit the poor" (Keil et al., 2008, p. 292).

An emic understanding, however, would argue that such etic studies lack self-reflection and questioning of assumptions. As explained below, much of the climate change adaptation research that utilizes a solely etic approach brings an abstract concept of "risk" and imposes the concept upon the communities studied. This paper argues that using a complementary emic understanding would prove useful to the climate change adaptation discourse focused on monsoon shifts and agricultural pests. This argument is grounded in the social science development theory that addresses important tenets of ecological impacts on agricultural communities and how the international community might respond (Blaikie, 1985; Escobar, 1995). This theoretical approach calls for a rethinking of the development discourse present in many climate change adaptation research projects, for including the larger social economy within projects' analyses, and for current power relations to be questioned. Studies taking an emic approach (Zimmerman, 1987; Garay-Barayazarra & Puri, 2011) examine the monsoon-community relationship in ways that are set-up to understand locally significant categories with conceptual terms familiar to the community studied.

Etic studies

Naylor and Mastrandrea (2010) define risk as the probability of the occurrence of an event multiplied by the repercussion of the event to human or natural systems (p. 127). They see risk as the result of variability brought about by climate change to agricultural production as well as long-term changes in the climate (p. 131). Naylor et al. (2007) argue that changing monsoonal patterns create large potential risk to Indonesia. Change creates risk. Such risks include "significant consequences for agricultural output, rural incomes, and staple food prices" (Naylor et al., 2007, p. 7752). Risk threatens economic stability, but also the daily foodstuffs of millions of Indonesians. Looking at historical moments of rainfall change using past El Niño-Southern Oscillation (ENSO) shifts, Naylor et al. (2002) argue that change can leave many within Indonesia hungry by disrupting the production of rice and corn (p. 76). These papers argue that change creates risk, where risk is perturbation and disorder within a system that can otherwise be seen as ordered.

Naylor and Mastrandrea (2010) use a risk assessment model based on the "probability of climate events, critical thresholds of damage related to those events, and the role of policy in reducing climate-related impacts on agricultural systems" (Naylor & Mastrandrea, 2010, p. 127). In such a model, Naylor and Mastrandrea (2010) bring together important variables in understanding not only how future changes might occur, but also how those changes could possibly interact with the policy in place. It is an in-depth, complex, etic model to assess potential risks from climate change to agricultural production. Such an assessment requires continual re-evaluation as new information is gleaned from policy and climate science, as described by Naylor & Mastrandrea (2010):

> Because risk assessment involves estimation of both the probability of climate events and the expected consequences of those climate events, it involves a process of knowledge updating, particularly with respect to the likelihood of climate events and how the impact of those climate events might propagate through the agricultural system. (p. 133)

As adaptation strategies are implemented, the assessment must be updated to reflect current changes. To analyze risk in such a manner, Naylor and Mastrandrea (2010) quantify uncertainty with Bayesian statistical analysis to create subjective probabilities of future uncertainty based upon the probability of climate events and the expected repercussions of said events (p. 133).

While reflecting policy changes and climate science information, the assessment does not include information about farmers' knowledge or policymakers' perceptions. In other words, the assessment takes a narrow focus that only includes etic, not emic, information, as well as using an outsider's understanding of climate risk to agriculture rather than an insider's perspective.

Taking an outsider's understanding through quantitative measurements is a common approach to analyzing climate adaptation strategies. Keil et al. (2008) measured drought resiliency of farmers in Indonesia by measuring how households managed risk. Rather than including farmers' definitions of risk, Keil et al. (2008) defined risk as farmer's lack of liquid assets and credit access. Keil et al. (2008) explore methods of quantitatively measuring resiliency of farmers to ENSO-related droughts in Central Sulawesi, Indonesia. They argue that improving household resiliency is the best method to stabilize poor communities to environmental vulnerability. Keil et al. (2008) examined resiliency at the household level using their own drought resilience index, which relied upon indicators such as households' liquid assets, credit access, and agricultural methods. Their focus is largely asset-based because, as Keil et al. state, "apart from the external economic, social, and political frame conditions, a household's risk management largely depends on its asset base and attitude toward risk" (2008, p. 294). They found most common risk management strategies occurred only after a drought had already hit because farmers had no access to an early warning system of upcoming droughts. Keil et al. conclude that an early warning system, coupled with major changes in agricultural planting methods, would allow farmers to better cope with climatic vulnerability. Keil et al. see coping with climate change, not preventing its effects, as the only route for these communities. The suggestion provided by Keil et al. for drought prevention strategies is permanent migration to a less drought-ridden area.

Studies like Keil et al. (2008) argue that expert knowledge should determine the metrics quantifiably measured to understand the successes of adaptation. Rather than incorporating communities' perceptions into their studies, most climate change adaptation studies rely on outside, expert knowledge (Howden et al., 2007; Naylor et al., 2007). Vermeulen et al. (2010) suggest the following as good practice:

> Actions towards adaptation fall into two broad overlapping areas: (1) better management of agricultural risks associated with increasing climate variability and extreme events, for example improved climate information services and safety nets, and (2) accelerated adaptation to progressive climate change over decadal time scales, for example integrated packages of technology, agronomy and policy options for farmers and food systems. (p. 3)

Such an approach that takes a solely etic understanding of the problem of climate change is common within the literature. External standards are measured to determine the successfulness of farmers' agricultural methods (Naylor et al., 2002; Salinger, Sivakumar & Motha, 2005). There is a lack of self-reflection and questioning of assumptions within these studies. Instead, the researchers bring an abstract concept of "risk" and impose the concept upon the communities studied. The studies fail to mention how the communities view such risks.

Other etic studies that suggest concrete solutions often focus on adaptation through externally developed technological advances. Fujisawa et al. (1993) suggest exactly that in examining how farmers could adjust their crop management practices. They investigate how farmers' agricultural practices (in light of environmental vulnerability) in India, Indonesia, and Myanmar can be improved through quantitative research. The researchers' intent is to find agricultural practices that would allow the three countries to overcome vulnerabilities presented by unpredictable monsoon rains.

Emic studies

Emic approaches within the development discourse provide alternative ways to read a landscape, to understand actors' involvement and to perceive development approaches. All call for a re-evaluation of the development discourse, which prioritizes and naturalizes state-centric beliefs of the landscape. This prioritization often benefits the state, which is not a coincidence. Incorporating emic perspectives into development projects would create a much more nuanced discourse surrounding development solutions to climate change risks.

Garay-Barayazarra and Puri (2011) researched how local cultural knowledge can be utilized in adaptation and resiliency strategies for climate vulnerability. Garay-Barayazarra and Puri (2011) situated their research at the local level to understand indigenous Badeng communities' perceptions of the monsoon and cultural intangibles. In doing so, they focused on specific aspects of perceptions of monsoons (relationship to ayurvedic medicine and sensory knowledge) within individual communities. Garay-Barayazarra and Puri (2011) encouraged the use of ethnographic and participant observation research methods to better understand how communities understand weather patterns in non-explicit ways. They argued that a strategy to climate vulnerabilities that only concerned itself with natural science weather forecasting but ignored the Badeng's

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conceptualization of their environment would fail. The authors state, for the Badeng, "direct bodily senses, rather than the inanimate instruments and computer models of modern scientific forecasting, are the avenues through which people come to experience and therefore know and predict manifestations of their local weather" (Garay-Barayazarra & Puri, 2011, p. 21). The Badeng view the world as deeply dynamic and connected to an individual agent's actions. They use that view to schedule daily agricultural activities as well as manage during times of extreme climate vulnerabilities, such as past mega-droughts. Such knowledge could provide a way forward to continued community resilience in light of climate change, especially when used to examine the concept of pests.

Many research studies have proved the usefulness of such an approach. For example, Stigter et al. (2005) demonstrated the importance of including traditional methods and indigenous technology within resiliency projects focused on meteorological variability. Kehi and Palmer (2012) showed the importance of understanding cultural traditions concerning water. Ellen (2006) examined the relationship between the cultural significance of the sago palm and crop management systems. Similar studies have explained why states do not take such an emic-centric approach in their development practices. Just as anthropologists have studied village-level peasant conceptualizations of nature and culture, Dove (1986) showed that anthropologists can do the same to understand how the state views itself in relation to the environment. In particular, the preservation of state-sanctioned environmental programs is often influenced by and has influence on state knowledge of unwanted, non-crop plants, i.e. weeds.

The same argument about weeds by Dove (1986) can be made about rats in eastern Indonesia. The Indonesian government's perception of rats misaligns with the local communities' understanding of rats. Such a misalignment may reflect a larger rift. As Dove (1992) argues, in Pakistan the etymological transformation of the term "jangal" from "savannah" to "forest waste" reflects a larger shift in physical and cultural values that have resulted from a "dialectical relationship between nature and culture" (p. 231). The Indonesian government's defining of rats as pests is an intentional move towards separating nature and culture. As the Indonesian government strives for modernity, it desires the Indonesian culture to represent the modernity of the inner islands, not the traditional heritage of the outer islands such as East Flores.

Dove (1986) explores the disparities between peasant perceptions and the Indonesian state's conception of two types of weeds. He provides a comparative analysis of the names and origin stories of the two weedy plants and presents a folk discourse of the environmental change. In doing so, he shows how the two belief systems are not isolated conceptualizations of weed knowledge, but rather a complex relationship between a community and nature that is expressed through the two groups' differing discourses. Dove (1986) argues that "state perceptions of both weeds are unvaryingly negative, based on its generally negative perceptions of systems of cultivation that employ fallow periods, and on its self-interest in expensive eradication programs and the alternative use of weed-covered lands" (p. 163). Just as Fairhead and Leach (1996) argue that the degradation discourse is created and maintained by social actors, Dove (1986) argues that the preservation of state-sanctioned environmental programs is influenced and influences state knowledge of weeds.

Similarly, Dove (1985) argues that the Indonesian state not only influences state knowledge of the environment, but that it has a vested interest in maintaining certain cultural myths over others. Dove (1985) examines state preference of irrigated rice cultivation over swidden agriculture. He argues that this preference is not neutral or without purpose, but rather that the Indonesian state benefits from the continuation of irrigated rice cultivation and does not benefit from continued swidden agriculture. He argues that irrigated rice cultivation systems are better suited to a centralized state than are swidden agricultural methods, which often align with decentralization of power. The preference of irrigated rice cultivation by the state, therefore, is purposeful because it is a "function of high population density [that] maximizes returns to land and capital" (Dove, 1985, p. 2). State perceptions of superior productivity of one type of cultivation system over another are not neutral. Instead, it reflects larger patterns of reality and produces new realities.

Dove and Kammen (1997) present such a re-evaluation in their examination of the "moral ecology of resource use" in which they compare Dayak gathered forest products and swidden agriculture against high-yielding seeds produced in the green revolution (91). The failings of green revolution systems, they argue, are not in the technology itself, but rather the ways in which the green revolution constructs its ideology of agriculture and the "immorality" of the green revolution's understanding of ecology (92). They compare the green revolution discourse with a Dayak folk discourse of ecology to find that the two groups define sustainability quite differently: "Whereas the Dayak system expects to make sacrifices for what is taken, the green revolution tries to optimize the difference between what it takes out and what it puts back in, the difference between outputs (crops) and inputs (fertilizer, etc.)" (Dove & Kammen, 1997, p.

96). Analyzing how local communities might perceive nature differently than practitioners (foresters or those implementing the green revolution technology) allows researchers to better understand the discourses used within development and the products of such discourses.

Adaptation and Resiliency

The distinction between etic and emic approaches to climate change is reflected in the larger debate on the differences between resilience to and adaptation to climate change. Adaptation is deliberate change in response to external stress (Nelson et al., 2007). Nelson et al. further specify that adaptation to environmental change can be understood as "an adjustment in ecological, social, or economic systems in response to observed or expected changes in environmental stimuli and their effects and impacts in order to alleviate adverse impacts of change" (2007, p. 398). As such, social groups negotiate within the adaptation framework to assess specific risks and determine due actions.

Nelson et al. (2007) argue such an approach is inadequate on its own. Instead, adaptation should be understood as a part of the larger, dynamic approach of system resiliency to climate change. As such, they define resiliency as "the amount of change a system can undergo and still retain the same function and structure while maintaining options to develop" (Nelson et al., 2007, p. 396). Resiliency, then, emphasizes system functions. Adaptation research focuses on actors, taking "an actor-centered view, focusing on the agency of social actors to respond to specific environmental stimuli and emphasizing the reduction of vulnerabilities" (Nelson et al., 2007, p. 395). As such, Nelson et al. see adaptation as an important subset of but inherently different from resiliency strategies to climate change. Adaptation is in response to a specific, static moment in time. Nelson et al. view adaptation as "incremental adjustments" and building resiliency capacity as "transformative action" (2007, p. 395). Development programs, therefore, should not stop at the small adjustments of change created by adaptation projects. They should use those steps for larger systemic transformations to create lasting community resiliency.

Adaptation projects are often only concerned with economic and technological development. In contrast, a resiliency project attempts to address all factors and outcomes, especially social and ecological ones. A resiliency approach views economic and social systems as coupled, not in opposition to one another. Nelson et al. state, "actor-based analysis [of adaptation] looks at the process of negotiation and decisions, and the systems-based analysis [of resiliency] examines the implications of these processes on the rest of the system" (2007, p. 399). It is a difference in framework view: investigating actors' decisions or investigating how those decisions work within a larger system. Resiliency examines activities, not actors. Examining resiliency strategies, rather than adaptation ones, requires conceptualizing systems as dynamic, inter-connected, and constantly changing. Such a conceptualization requires emic approaches to the subject as well as etic ones.

Case Study

It is the national Indonesian government, not the local agricultural department in the outer islands like Flores, that promotes the use of pesticides. While the local East Flores agricultural department offers farmers the option of pesticides (for free), officials prefer if farmers choose the so-called "cultural" option. This option entails a rat ceremony performed by the elders of an individual village. As an agricultural department official stated:

> This special ceremony sends the rats back to where they belong--the sea--and is the most successful approach to clearing rats from agricultural fields. In my experience, the ceremony guarantees that rats will not return to a field for at least five years. If pesticides are used [instead of the ceremony], the rats will return next year with anger.

Another official clarified this quote by stating:

> The rat can be both enemy and friend. One must ask the rats nicely to return to their home in the sea by conducting the ceremony. One must be polite to the rats. Using pesticides is not polite to the rats.

According to most farmers in East Flores, a long-standing relationship between farmers and rats exists and must be respected.

Why is this relationship so? Rats hold an important place within the culture of East Flores, Indonesia. Most believe that today's rats are descendants of ancient rats that aided the farmers' ancestors in a time of crisis. As one farmer explained:

> We cannot hurt the rats, even when they disturb our fields because they showed my ancestors the way to this land when they had to move from their original homeland many years ago. A big storm destroyed the original homeland, and so my ancestors' needed a new one. The rats were the navigators in the boats my ancestors took to come here because they are of the sea and know the sea.

Therefore, from an emic perspective, today's rats do not represent random pests attacking agriculture but rather

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misguided old friends. Performing the rat ceremony allows farmers a favorable, restorative role: to navigate the rats back to their homelands just as rats once directed the farmers' ancestors to their homeland in East Flores. Berkes, Colding and Folke (2000) demonstrate similar uses of traditional ecological knowledge in climate change adaptation strategies.

To direct the rats, a three-step ceremony is performed: sacrifice, procession, and forest mixture. A farmer explained the first step: "The rat ceremony starts with the sacrifice of a pig. Other ceremonies can sacrifice different animals but for the rat ceremony, it must be a pig." The sacrifice must follow strict guidelines. Village elders from the four major clans must perform certain rites and position themselves around the pig as it is being sacrificed. These rites and positioning reflect the clans' roles within the village. The second step of the ceremony involves a village member carving a rat statue about 15 centimeters in height and a canoe about 30 centimeters in length. The rat statue is put inside the canoe. The elders, along with the entire village, accompany the canoe from the agricultural fields down to the sea in a long procession. At the sea, the elders recite prayers asking the rats not to return to the fields, and the canoe with the rat statue inside is left to drift out to sea. When the elders return to the village, they go into the forest to collect special leaves and roots only known to the elders. These forest goods are mixed with water and brought to the agricultural fields. There the elders recite prayers and spread the mixture onto all the fields using palm leaves to sprinkle the liquid. Such a forest mixture provides food for the spirits of the fields, ensuring a healthy (and rat-free) agricultural plot.

Farmers must wait three to six days, depending on the elders' decree, before returning to their fields. As one farmer said:

> We must not return at all to our fields during that time. I have used that time in the past do to work around my house or to go fishing. When the elders say we farmers may return to the fields, there are no more rats. The rats are happily back in the sea and I am happily back in my field with crops still alive to feed my family with.

All farmers reported the same thing, as did the local East Flores agriculture department officials: when done properly, the rat ceremony always works to rid fields of rats in a way acceptable to both rats and farmers.

This ceremony is usually performed in February or March because as one farmer explained, "Rats appear when the big rains have ended and there is no rain to deter the rats but lots of good corn and rice for them to eat." An agricultural department officer agrees: "The appearance of rats in fields directly relates to rainfall and the intensity of rainfall. Rats become especially present if there are periods of a lot of rain and severe periods of no rain." From these accounts, there appears to be a close relationship between the behavior of the monsoon and the performance of the rat ceremony.

Similar to the differing perceptions surrounding the rat ceremony in East Flores, the lack of clarity within the practice of augury (interpreting omens from observing the flight of birds) in Borneo shows the ways in which nature and culture are understood and the relationship between the two are conceptualized. Dove (1996) argues that "augury is less a projection on to the environment of what society thinks about itself than a reflection (and operationalization) of what society has learned about its environment and about the relationship between itself and its environment" (p. 559). Inner islanders view rats as pests. Outer islanders see rats as something not to be eradicated but rather re-directed. They represent misguided friends, not pests. Rats are matter out of place. To the local community, rats belong in the sea, not the fields. The mistake rats make by living in the fields (and thus eating all the crops) is something to be gently corrected through ritual, not harsh chemical warfare with pesticides. In the end, what matters is a stronger inter-community relationship and a perspective that views humanity and nature in coexistence.

Discussion

Ensuring community resilience is an essential tenet of climate change adaptation and resiliency (Adger et al., 2012; Berkes, 2007; Folke et al., 2010; Folke et al., 2002). The coming shifts presented by climate change are unknown and unpredictable. What is known is that rural communities dependent upon small-scale agriculture are particularly vulnerable to disintegration of community cohesion. Community resiliency provides at least some stability in a time of great changes (Adger et al., 2012; Nelson, Adger & Brown, 2007). Practices like the rat ceremony do just that. The ceremony provides an emphasis on working with other community members and in harmony with nature, which is essential to withstanding the challenges presented by climate change (**Figure 2**). The rat ceremony should stand as an example of other possible definitions of climate change resiliency strategies. Instead of solely etic, top-down approaches, climate change adaptations could build upon existing social practices by explicitly taking an emic understanding of problems created by climate change, which would help communities to adapt from within.

Photo Source: S.A. Casson

Figure 2 : Community solidarity created through celebrations and ceremonies helps ensure climate change resiliency

Studies like Keil et al. (2008), Fujisaka et al. (1993), and Naylor and Mastrandrea (2010) use an etic lens to focus on adaptation strategies to climate perturbations in Indonesia by taking a quantitative, economic and technical approach that leaves no room for differing perceptions of risk or practices of agriculture. These researchers focus on how climate science can be "applied wisely" to agricultural policies, without explaining whose definition of 'wise' is being used and how it might differ from other definitions (Naylor & Mastrandrea, 2010, p. 138). Researchers taking an etic-only approach assume that the problems of agricultural adaptation within Indonesia lie only with the lack of future climate data. Future research, therefore, is directed only toward perfecting climate models' projections rather than also directing research to how resiliency is understood and implemented by multiple actors with possibly differing incentives, beliefs and practices.

An etic approach emphasizes technical inputs as solutions for the rats' presence in agricultural fields. These solutions usually come in the form of expensive chemicals dangerous to animals other than rats. In the following, Tsing (2005) explains pesticide use against rats in Borneo:

> The plantation, they say, sells rat poison named 'kill a rat.' I hear overtones of death, sweeping from the English-speaking north. At home, I find the poison 'Klerat' on the Web, from the British firm Sorex, a product of its international line. This is a second-generation anticoagulant poison, formulated for rats that have become resistant to warfarin. Elsewhere on the Web, I find complaints that it is killing British owls and California wildlife, even as the rats are becoming resistant again. I'm sure it is effective in killing off a broad spectrum of Bornean tropical rodents and other small animals, possibly sparing the cosmopolitan Norway rats, who seem quick to adapt to almost anything. (p. 46)

Similar pesticides are used across the Indonesian archipelago.

Etic perspectives on climate change resiliency also apply to how the majority of studies view insects and rodents within agricultural fields. These animals are universally deemed "pests" and technological systems are suggested to best eradicate them from fields (Huda, 2007; Garrett et al., 2006). Howden et al. (2007) argue for "Improving the effectiveness of pest, disease, and weed management practices through wider use of integrated pest and pathogen management, development, and use of varieties and species resistant to pests and diseases and maintaining or improving quarantine capabilities and monitoring programs" (p. 19693). Such effective management of pests is often understood as a necessary eradication of pest populations, best done through technological inputs, like chemical poison (Pasotti, 2006).
Etic frameworks do provide valuable perspectives on possible climate change adaptation, but should not be understood as the sole answer. Useful solutions cannot be found by only using etic tools to analyze fundamentally personal and disordered concepts like climate change adaptation and resiliency. A solely etic approach to pest management has major drawbacks. It promotes individual action over community cohesion and relies heavily on the input of dangerous pesticides—both in the name of climate change adaptation. When rats are found in a field in East Flores, the farmer reports to the village chief, who contacts the agricultural department. As one government official explained, farmers can then choose from three pest management options: 1) pesti-

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cide use, 2) traps, or 3) cultural ceremony. According to the official, the Indonesian government strongly prefers farmers to choose pesticide use. The Indonesian government gives out pesticides to individual farmers, not communities. The pesticides are often applied to some fields in a village but not all, emphasizing the singularity inherent to pesticide use. Management of rat populations through etic approaches that prioritize individual application of dangerous pesticides exemplifies many development projects looking to promote climate change resiliency at the local level.

Conclusion

Seeing the rat ceremony as a potential resiliency strategy to climate change proves a useful example of an emic understanding. When performed, the rat ceremony emphasizes two main principles: community solidarity and coexistence with nature. The rat ceremony is said to only work when the community is of "one mind and one heart." Community solidarity, instead of pest control, becomes the focus of the climate change resiliency. Rather than attacking nature through heavy pesticide use, the rat ceremony provides a different narrative to the human-nature relationship. Rats are friends of the farmers that must be guided back to their homeland in the sea through polite requests and prayers. Community solidarity helps to ensure a community's resiliency to the problems created by climate change.

An etic approach would likely ignore intricate social dynamics that are of rapidly shifting form and thus overlook major tenets to a community's own resiliency to climate change and social change. Incorporating local cultural conceptions of what constitutes solutions to problems created by climate change can be effective. An emic understanding of place provides in-depth context to a pest problem. An etic approach often just calls for increased use of stronger pesticides, which presents possible health risks to the community and potentially removes an important reason to bring the community together on a regular basis.

The development discourse, as employed by practitioners for hydrological, soil erosion, forestry or other perceived problems, often misses such a nuanced understanding of the multiplicity of actors and perspectives. Blaikie (1985) argues that the development discourse views landholders as selfish and ignorant consumers of the environment in ways that cause soil erosion and as needing intervention from development practitioners to re-direct the landholders' values and actions. Such a discourse serves to maintain the idea that the problem of soil erosion, like the problem of forestry or green revolution agriculture, exists in the technical realm. Conversely, work from Blaikie (1985), Escobar (1995), Fairhead and Leach (1996), and Dove and Kammen (1997) introduce new perspectives that understand environmental degradation problems as originating from socio-economic standards. These authors argue that the solutions produced by the development discourse, which only focus on technical induced innovations, will never solve the problem of soil erosion or social forestry. Instead, solutions will come from discourse that understands the problem of soil erosion is "a matter not of what exists but of who commands what" (Blaikie, 1985, p. 3). Solutions that focus only on the physical realm, not the social, cannot be effective because the problems do not lie in the physical realm. As Dove (1995) argues, solutions cannot focus solely on the trees, but instead should examine the multiple social understandings of the trees.

Examining how research creates conceptualizations of reality allows one to better understand how these discourses are used and what they produce. Etic approaches construct frameworks in which development—through policymakers or international organizations—views itself as an organizing force to combat the disorder of a natural disaster. Development orders both farmers and climate by viewing both as concepts of perturbation and disorder in need of controlling. Unknown farmers must be encouraged to follow the right policies, climate changes must be modeled, and risks of the chaos produced by both must be assessed through etic-focused research. Including emic-focused research would require a re-examination of development concepts of order and disorder. Including emic-focused research would require shifting the discussion of climate change adaptation and resiliency. Research would have to confront existing power structures and view climate change, along with other disasters, as social and political embodiments of how, why and who a hazard affects, rather than understanding policy as a simple binary to be imposed upon unknown farmers. Climate change policies that incorporate multiple discourses about the environment—etic and emic—would help push policymakers to question top-down dissemination of knowledge and look for bottom-up solutions, rather than re-enforcing the status quo of development discourse power structures.

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Conflict of Interests

The author hereby declare that there are no conflicts of interest.

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