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Rain Rituals as a Barometer of Vulnerability in an Uncertain Climate

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Cover Page Footnote

Khanimambo to the elders, regalos, and other residents of Gala and Madjadjane, Mozambique. Thanks also to S. Manheçe and L. Naiene for their extensive field assistance with interviews and translation. A US Student Fulbright scholarship and National Science Foundation DDIG# BCS-0720077 provided funding for this research. I dedicate this paper to my dad, Walter Shaffer (1927-2014), who taught me about the importance of peoples' religious beliefs and practices during difficult times.

RESEARCH ARTICLE

Rain Rituals as a Barometer of Vulnerability in an Uncertain Climate



L. JEN SHAFFER

ABSTRACT

Researchers and aid agencies, seeking to improve their understanding of local climate change responses, adaptation, and vulnerability, frequently interact with communities around the world who strongly emphasize their religious beliefs and practices. Dismissal and misunderstandings of these local perspectives can slow assessments of local climate vulnerability and development of adaptive capacity. In this paper, I show how analysis of rain ritual failure exposes the multiple stressors Ronga communities in southern Mozambique face, and as such, serves as a proxy measure for climate vulnerability at the local level. Oral histories and targeted interviews with participating elders, local chiefs, and community members documented local rain ritual practices and changes to these practices over the past 50 years. Emic descriptions of ritual practice, perceived changes, and explanations for ritual failure were analyzed with pre-determined and emergent codes and situated within the local and regional social, economic, political and environmental context to identify sources of community vulnerability. This research highlights the value of exploring local religious beliefs and practices when assessing local vulnerability and capacity for responding successfully to current and future climate uncertainty.

INTRODUCTION

Rain may not fall during seven months, from April to October, and nobody worries about it. But if it fails in November and December, at the beginning of the rainy season, it is a dreadful misfortune, a calamity more serious than any other. The life of every individual, and consequently of the whole clan, is threatened. Famine will surely follow... No wonder therefore that the imagination... has invented ways and means of regularizing the

rainfall, and that rites, and charms, and all the powers of magic have been resorted to with a view to ensuring the precious rain to the tribe at the right time. (Junod 1962[1926]: 315-16)

Cultures and communities around the world practice a diverse array of rituals as adaptations to climate uncertainty. Researchers, aid agencies, and policy makers may be tempted to discount ideas linking religious beliefs and practices to climate uncertainties and adaptive solutions. Yet rituals are more than

just part of a local religious belief system; they are a social process. Studying climate rituals provides an opportunity to understand perceptions, responses, and vulnerabilities to locally important climate risks because rituals incorporate, symbolically and literally, historic experiences and local social-ecological conditions (Bell 1992; Douglas 1999; Rappaport 1968, 1999). One way southern African cultures have traditionally dealt with rainfall variability is through rituals focused on increasing the likelihood that the right amount of rain falls at the most appropriate times (e.g. Huffman 2009; Junod 1962[1926]; Krige and Krige 1943; Mbiti 1969). However, the dynamic nature of ecosystems, ongoing socio-economic and political change, and shifts in global biophysical systems have affected expected climate risks, altered vulnerabilities, and modified responses in this region (e.g. Bunce et al. 2010; O'Brien and Leichenko 2000; O'Brien et al. 2004; Niang et al. 2014; Yanda and Mubaya 2011). The multiple stresses generated by these changes negatively impact livelihoods and well-being, and constrain access to important resources for climate adaptation—resulting in changes to ritual practice. Differences between descriptions of past and current rain rituals, as well as explanations for ritual failure, could therefore provide insight into local vulnerability and thus a community's capacity to respond successfully to current and future climate uncertainty.

In this paper, I describe Ronga rain rituals practiced in Matutúine District, Mozambique, and contextualize community members' explanations for ritual failure within the local social, political, economic, and environmental milieu. I first summarize the relevant literature, then briefly outline the study area and my methods. The results section describes the ritual performance as recounted by residents, and details local explanations for ritual failure. Finally, I discuss how Ronga rain ritual failure exposes the multiple stressors affecting communities in Matutúine District, and, as such, serves as a proxy for measuring vulnerability to climate uncertainty when community experiences and knowledge are assessed within this broader context.

RAIN RITUALS, ADAPATION, AND VULNERABILITY

The importance of rain in the social-ecological systems of southern Africa cannot be overstated. Too much or too little rain at the wrong time or place destroys crops, relocates human, livestock and wildlife populations, increases wildfire events, and affects disease transmission (Niang et al. 2014). While communities and individuals may anticipate and take action to minimize or eliminate harmful impacts from known climate risks, some uncertainty and vulnerability will always remain. As such, rain rituals can be seen as a community level adaptation to reduce the uncertainties of rainfall variability and control what is seen as a sacred phenomenon (Hannaford and Nash 2016; Mbiti 1969).

A diverse literature exploring rain rituals in southern Africa documents historic and contemporary activity while examining the complex interconnectivity of human-environment relationships. Early scholarly studies by missionaries, anthropologists, and others focused on assessing the rationality of various practices. Junod (1962 [1926]) examined Ronga rainmaking in rich ethnographic detail to assess connections between the importance of rainfall timing, ritual practice specifics, and desired results. A comparative review of rainmaking rituals across southeastern Africa from this same period acknowledges that water, particularly rainfall, is the basis for all life, and links rainmaking to political power and male virility (Dornan 1928). Beemer contextualizes the Swazi rain ritual as a way to organize traditional environmental knowledge associated with rain and integrate political and economic organization (1935). Ethnographic descriptions of Balobedu culture in Limpopo, South Africa emphasize the centrality of rain, rainmaking, and rain rituals to everyday village life within a culture where a hereditary rain queen holds political and spiritual power (Krige and Krige 1943).

Political power, gender, and fertility remain significant themes in current studies of historic and contemporary rain rituals. A recently published

synthesis explores how rainfall variability, expressed in seasonal and longer term wet-dry cycles, influenced state formation and collapse in southeastern Africa over the last millennium (Hannaford and Nash 2016). Archaeological evidence suggests that control of ritual performance and participation was used by native and colonial elites to maintain both political and economic hegemony at Mapungubwe, in Shaka's Zulu kingdom, and on Portuguese estates in the Zambezi valley. Sanders' work in Tanzania explores rainmaking's role in Ihanzu knowledge production and sense making of the world (2008). Ihanzu rainmaking rituals symbolically encode complex relationships between community members, and between the community and their surrounding environment. These recent studies suggest that broadening analyses of African rain rituals beyond traditional themes could give insights into other aspects of a community or culture, including local climate vulnerability.

Researchers increasingly report the importance of religious beliefs and rituals in community-level climate adaptation and vulnerability (e.g. Byg and Salick 2009; Gómez-Baggethun et al. 2012; Hesed and Paolisso 2015; Hiwasaki et al. 2015; Huffman 2009; Kusters and Wangdi 2013; Murphy et al. 2016; Ronkoana 2016; Schipper 2010). Rappaport's (1968, 1999) assertion that rituals serve as a self-regulatory, community adaptive response to persist in the face of social-environmental change is supported by these observations. Climate change adaptations are long-term behavioral or physical changes undertaken by individuals, households, and communities in response to ongoing and expected climate changes, climate-influenced processes, and climatic events (Adger et al. 2005; Smit & Wandel 2006). Cultural preferences and technologies including food, architecture, and clothing act as adaptive measures to reduce or eliminate climate-related risks. Other cultural adaptations like livelihood practices and specialized knowledge take advantage of local environmental conditions and account for climate patterns to secure and produce resources for households and communities. In this light, ritual practice also can

provide a flexible adaptive response at the community level to changing climate conditions.

Rituals bring community members together to mark significant events and maintain traditions that connect them to their cultural and communal past (Bell 1999; Douglas 1999; Rappaport 1999). As participants engage their emotions and imaginations to derive personal meaning, ritual practices reinforce cultural identities, communal norms, and local institutions. In some Tibetan communities, climate changes and events carry spiritual and moral weight because community members see droughts, hail, and blizzards as angry deities responding to local neglect of religious duties or outsiders breaking local taboos (Byg and Salick 2009). This neglect of duties and this taboo-breaking erodes traditional identities, institutions, and norms that can support effective responses to environmental change. Therefore, rituals promote stronger social network ties as community members come together to reduce perceived climate risks.

Ritual performance may also distribute climate risks more equally throughout the community. Evidence of ritual cleansing rites associated with rainmaking provides proxy dates for severe droughts periods (400-1600 CE) at Mapungubwe in Limpopo, South Africa (Hannaford and Nash 2016; Huffman 2009). Contemporary ethnographic comparisons suggest that during historic cleansing rituals, communities destroyed all food remaining in their granaries and sometimes burned their homes; effectively redistributing starvation risks more equally amongst community members. Rituals can also address anticipated climate uncertainties based on historic experience. Churches host prayer meetings for all of the community during drought periods, but contemporary women farmers in Limpopo Province, South Africa, also perform traditional rain-making, seed-dressing, and crop maintenance rituals to ensure household food security (Ronkoana 2016). Maintenance of gendered traditional ritual practice as an adaptation highlights the importance of recognizing and working with local knowledge and

cultural belief systems in climate change adaptive planning.

Rituals have been defined as “more or less invariant sequences of formal acts and utterances,” however, performances can shift in response to ongoing social-ecological change (Rappaport 1999: 24). New events and experiences of social, political, and economic conditions build upon the historic experiences and conditions that initiated a ritual’s development (Bell 1992, Douglas 1999). Such new conditions may be reflected in different participants, variation in timing or sacrifice sizes due to open-ended rules regarding practice specifics, or even syncretic changes following a cultural shift. For example, locals in Doñana, Spain have held *Traslados* since the 16th century to petition the *Virgen del Rocío*’s aid during droughts and economic crises, but these rituals are based on older pagan rites (Gómez-Baggethun et al. 2012). Comparative study in Zambia and Malawi suggests that the manner in which Christianity was introduced and adopted by rural communities has influenced the adaptive capacity of their food production systems (Murphy et al. 2016). More respectful integration of Christian beliefs with traditional religion in Malawi promoted the maintenance and valuing of traditional environmental knowledge and reduced tensions over use of Western science as compared to how the adoption of Christianity occurred in the Zambian community. However, researchers note that ongoing evolution of this co-existence will continue to shape adaptive capacity in the future. Similar shifts in social, political, and economic conditions affecting ritual performance likely also impact climate vulnerability within communities.

Assessment of rituals reveals locally important aspects of exposure, sensitivity, and adaptive capacity—the three components of vulnerability that influence the success of adaptive responses. However, there is also value in analyzing participation in ritual performance more broadly to assess vulnerability related to social relationships and status. Schipper’s (2010) work with El Salvadorans showed how membership in an activist-led church affects climate vulnerability by

influencing risk perceptions, causal understandings, preparedness, and responses. Members of proactive churches felt empowered to respond to climate change compared to neighbors belonging to congregations having a more passive and fatalistic theology. Research documenting differential declines and increasing isolation of African American churches on Maryland’s Eastern Shore links these trends to increased vulnerability to climate-influenced sea level rise and storm events (Hesed and Paolisso 2015). Congregations with declining membership over the past 50 years showed greater losses of adaptive capacity due to lost access to information and other resources once shared across wider social networks. Bhutanese farmers in Punakha see Buddhist rituals as the most important way to deal with changing precipitation patterns, although not everyone within a community contributes equally (Kusters and Wangdi 2013). These Bhutanese families can spend \$100 USD or more on household rituals depending on family needs and resources, while community rituals require in-kind donations of cash and rice that vary by family size and household economic conditions. These studies highlight how leadership, social identity, social networks, and differential resource access connected to religious rituals affect vulnerability even within communities.

As an adaptive social process, rain rituals link people to their cultural past, to other members of their community, and to the natural world. The knowledge that ritual participants create, share, and maintain through their practice strengthens their climate resilience and offers a window into how communities conceptualize their own vulnerability (Hiwasaki et al. 2015). This knowledge, grounded in culturally-based worldviews, shapes their perceptions of who or what causes climate change and how best to respond. However, emic perspectives can contrast sharply with the knowledge and models that researchers, non-governmental workers, and policy makers use to assess vulnerability and develop climate adaptation policy. Anthropological approaches offer ways to draw out emic perspectives that situate vulnerability within the local culture and contextualize ritual

practices within the broader milieu to link these diverse knowledge models and improve our capacity to address vulnerability in locally appropriate ways.

STUDY AREA

Matutúine District encompasses 5,403 km² of southern Maputo Province, Mozambique (Figure 1). Approximately 90-95% of the district's 40,701 residents self-identify as Mazingiri Ronga (INE 2013). Historic shipwreck accounts describe Mazingiri Ronga communities in the lands south of Maputo Bay and east of the Lebombo Mountains almost 500 years ago; oral histories and archaeological evidence document this group in the region at least 1,500 years (Bruton et al. 1980). Like their ancestors, most residents live in small villages dispersed across tall coastal dunes covered by a mosaic of forest-savanna habitat. Day-to-day living conditions and economic opportunities remain limited despite close proximity to the capital, Maputo, and the South African border. Sparse public transportation along the region's single main road connects main communities like Zitundo, Salamanga, and Bela Vista where residents access health clinics, secondary schools, and markets. Multigenerational households practice swidden agriculture and forage wild plants for food and medicine—supplementing household resources and generating income via freshwater fishing, goat and cattle herding, mat and charcoal production, reserve work, and casual labor. Average annual incomes in Matutúine District range from \$500 - \$1,000 USD. While men traditionally migrated out for work and sent home remittances, nowadays both young men and women migrate to Maputo, Durban, and Johannesburg for paid labor and educational opportunities (Shaffer 2009).

Conflict, conservation policy change, and shifting climate patterns have impacted the social-ecological system of Matutúine District since national independence in 1975. During Mozambique's civil war (1975-1992), district wildlife provided food to FRELIMO and RENAMO troops, and elephant ivory paid for arms. Rural residents

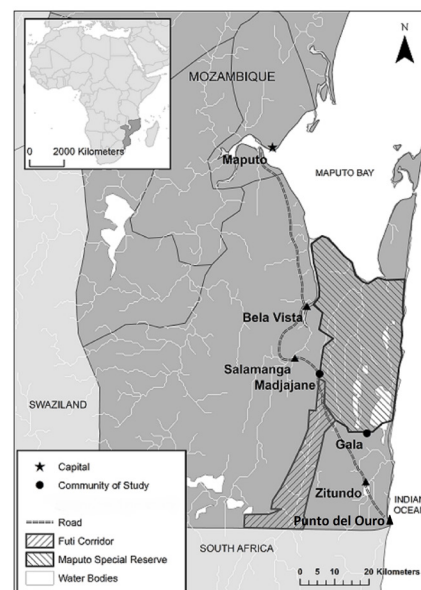


FIGURE 1. Matutúine District, Mozambique.

were removed from their homes on Christmas 1986 by FRELIMO forces and sent to protected encampments. The homes and remaining household goods were burned, and livestock confiscated, to prevent RENAMO from acquiring resources. Many local residents left the district to stay with relatives in South Africa, Swaziland, and Maputo for the remainder of the war, and not all returned. Those that stayed in Mozambique during the war endured significant hardships that scarred them physically and emotionally despite non-combatant status. Both those that remained in Matutúine and those that returned faced severely reduced economic conditions.

As the country rebuilt following the 1992 peace accords, new conservation policies were established to protect Matutúine District's remaining biodiversity. The new policies formally reestablished protected areas like Maputo Special Reserve and Licuati Forest Reserve, and preserved traditional rights to harvest plant materials for personal consumption within protected areas. Since 2000, development of the Lebombo Transfrontier Conservation Area has incrementally forced villages out of reserve boundaries and limited access to water and arable land along the Futí River corridor in the effort to

protect existing wildlife and reintroduce native species. Locals appreciate the animals, but weak governmental responses to crop raiding and reduced resource access with no compensation frustrates them as their families suffer from reduced household production. Rising temperatures and shifting rainfall patterns over the district have been observed by local residents and measured at the nearest weather station (Shaffer and Naiene 2011). Residents state these changes have affected household production and livelihood activity through declines in crop and wild fruit production, increased elephant crop raiding, more wildfires, and water insecurity.

METHODS

Ethnographic fieldwork in Madjadjane and Gala during 2004 and 2007-2008, two rural villages in Matutúine District, revealed many ways residents use their local environmental knowledge to respond and adapt to observed environmental changes (Shaffer 2009). A previous study showed that 81 percent of respondents consistently attributed the droughts in this region—especially those post-civil war—to failed rain rituals (Shaffer and Naiene 2011). This widespread emphasis during interviews of the failure of rain rituals, despite the exposure of community members to Western scientific explanations for climate change through school or work with non-governmental organizations, encouraged me to pursue additional questions about local ritual practice and outcomes, reasons for failure, observed alterations to rain rituals, and explanations for these changes to better understand local perceptions of climate vulnerability.

The 39 interviews incorporated two different data collection opportunities in both communities. Given that rain rituals were discussed in the first two interviews I conducted, both oral histories, it was relatively easy to include questions on ritual practices in all subsequent interviews. I first collected oral histories from ten elders aged 55 to 100+ years old, including five women and five men, and two **regulos** (chiefs). These elders were identified by the

regulos and community council members after they discovered my interest in local history and community change. The regulos, both men, also volunteered for interviews since they keep the official community histories and could answer questions about specific cultural practices that might arise during the oral history collection. The second opportunity to explore local rain ritual practices arose during a series of semi-structured interviews with 29 men and women, aged 30-100+ about perceived changes to local climate conditions. Elders, regulos, community council members, and the informants themselves made recommendations for these climate interviews. Participants in the two data collection opportunities include a few solely traditional religion practitioners, but the vast majority of respondents attend of a variety of local Zionist and Evangelical Christian churches. Individuals vary in their traditional religion participation based on congregational norms and personal views. All respondents were able to provide some information on ritual practice and sacred forest areas, including the Christians who rejected traditional beliefs completely. Table 1 describes community and interview respondent age and gender demographics.

Interviews were translated and transcribed into English from Ronga and Portuguese by a Mozambican fluent in all three languages. During analysis, I applied pre-determined codes like timing, participants, ritual elements, and ritual activity to both the oral history and semi-structured interview texts to build a picture of the local Ronga rain ritual practices and perceptions of change to these rituals during the lifetimes of local residents. Additional thematic codes emerged during the analysis about explanations for ritual failure, including ritual element changes, participant changes, and disrespect of tradition.

Regulos and participating elders provided specific details about rainmaking ritual practices. As a relatively youthful foreigner and married female, I was not permitted to attend the ritual in the sacred forest. Both field assistants with whom I worked during my time in the field were also too young to

TABLE 1. Community and interview respondent demographics.

	Madjadjane	Gala
Community Demographics		
Number of households	64	24
Total Population	331	114
Number of males	163	64
Number of females	168	50
Children (0-15 years)	124	46
Adults (16-70 years)	193	61
Elders (70+ years)	14	7
Number of Oral History Interviews		
Chiefs	1	1
Male elders	2	3
Female elders	3	2
Number of Climate Interviews		
Men (70+ years)	1	2
Men (30-70 years)	4	7
Women (70+ years)	4	2
Women (30-70 years)	7	2

attend the sacred ritual. As a result, my ethnographic description is limited to interview descriptions and may not include key details that could illuminate additional issues with local vulnerability. Additionally, I participated in the public celebrations held at Madjadjane Primary School in February 2008 with my field assistant, and enjoyed the relaxed conversation, fresh canhu beer, and dancing. We contributed money to the community's school fund, observed the collection of a beer tithe to offer the ancestors during the ritual, and were soaked by the rains that fell before the ritual ended.

RESULTS

Mazingiri Ronga Rain Rituals in Matutuine District

The regulo, a **curandeiro** (traditional medicine practitioner), and elders gather twice a year in late August or early September just prior to the growing season and again in late January or early February to conduct a rain ritual. I was told the events typically unfold as follows. Prior to the growing season, the community petitions the ancestors to intercede with

God and ask for rain. As the first crops are harvested, a second ritual is conducted to give thanks for the rain that has fallen during the growing season and ask that the rains continue for a good yield. Although the regulo is a key figure in the rain ritual, the curandeiro decides what day the ritual should be held. In some Ronga communities, the regulo and the curandeiro are the same person, but both Madjadjane and Gala currently separate these two powerful positions. Once the curandeiro chooses the day, the regulo and community elders begin acquiring materials for the sacrifices. These materials include a bull (*Bos taurus*), a kid goat (*Capra aegagrus hircus*), and locally produced alcohol. Depending on the location and season, **sura**, palm wine made from *Phoenix reclinata* sap; **tontonto**, traditional sugar cane (*Saccharum officinarum*) alcohol; **mapira**, a sorghum (*Sorghum bicolor*) beer; or **canhu** beer made from *Sclerocarya birrea* fruit, may be purchased from a local brewer. Community members often donate canhu beer as part of their contribution to the harvest festival. Sacrificial livestock must be healthy, and at least a liter each of two different alcohols is needed. One of the two regulos I interviewed stated that a second bull was often kept in reserve for community

consumption during the festival accompanying the ritual. An elderly woman mentioned that people bought white chickens for the ritual, but said they were not part of the sacrifice.

On the day of the ceremony, the regulo and elders enter the sacred forest where the remains of the ancestors, all past regulos, are interred. Aged 60-80, the elders are primarily male, and, regardless of gender, must be sexually inactive. The regulo commences the ritual by calling out the names of his ancestors, beginning with the most historic and ending with the most recently deceased. He then explains that the group has come to ask for the help of their fathers and grandfathers in obtaining rain from God. The regulo appeals to his ancestor’s responsibilities towards their living children and asks for their intercession. “Without rain, crops will not

grow, livestock will not fatten, and their descendent children will die of starvation,” one regulo stated. The group sings special ritual songs. After slaughtering the bull and goat, alcohol is poured out on the ground as libation to the ancestors. The group consumes some of the meat and the remaining alcohol within the sacred forest boundaries. Nothing is taken back to the community. If the ancestors are pleased with the sacrifice and ritual, the rains will fall – sometimes beginning even before the group leaves the sacred forest. Figure 2 depicts a model of the Mazingiri Ronga rain ritual.

Ritual Failure and 50 Years of Change

Although respondents provided many reasons for rain ritual failure, their explanations fall into three main categories: ritual elements, participants, and

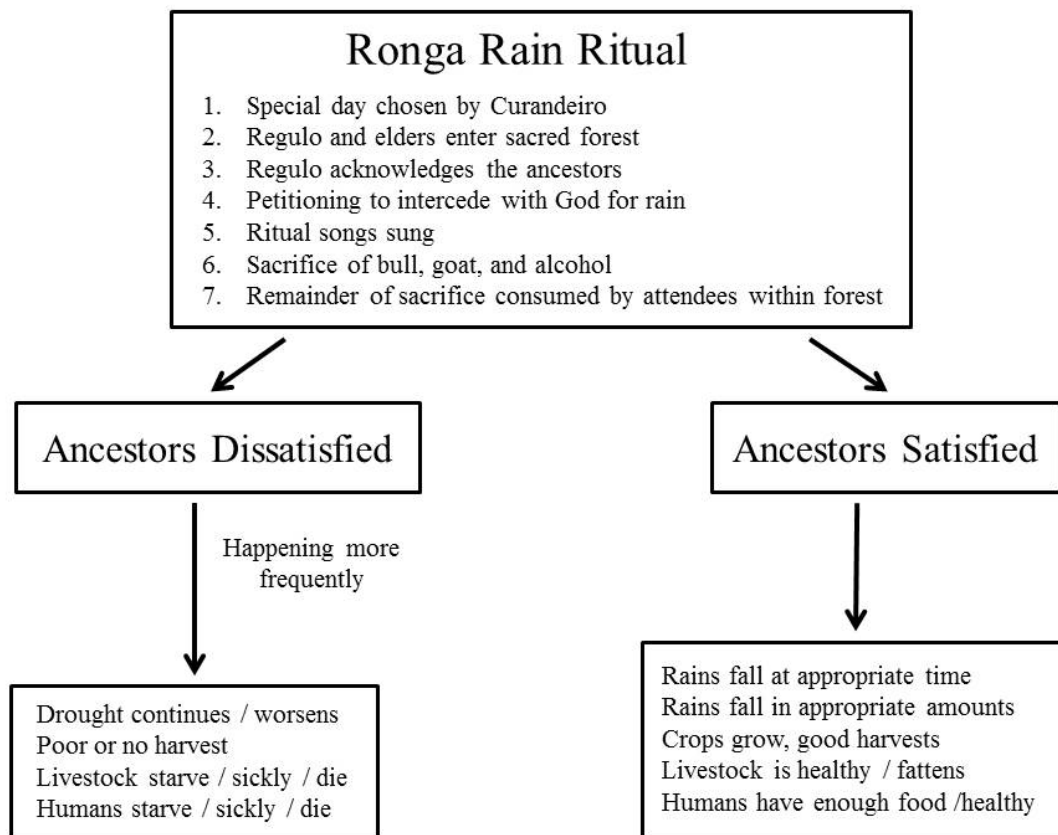


FIGURE 2. Model of the Process and Outcomes of Mazingiri Ronga rain rituals in Matutuine District, Mozambique.

disrespect for tradition. Their reasons reference the breaking of cultural taboos and signify changes to the ritual over the past 50 years. These changes stem from local social, political, and economic changes within the community, and these changes contribute to increased climate vulnerability.

Failure to conduct rain rituals jeopardizes needed rainfall from the start.

God is not lazy, he waits for them to make the ceremonies to ask for rain, and they don't make them. (Gala male elder)

In some years, no ritual ceremonies are performed, and in other years the ritual is performed only once. Elders and other respondents elaborated that rituals were not being held because of the inability to acquire proper sacrificial materials.

The ancestral spirits are angry because what needs to be done is not done. If they made the ceremonies today it would rain. They do not make them because there is no money or resources to buy alcohol and bulls. (Madjadjane male elder)

Gala's regulo mentioned conducting rain ritual ceremonies only once towards the end of the growing season in late January or early February, during the first fruits harvest festival. The first fruits harvest festival begins when the canhu fruits ripen, and can be made into juice and beer. Canhu (*Sclerocarya birrea*), or amarula as it is known in other parts of southern Africa, is a tree sacred to Ronga people. The first fruits harvest rain ritual involves sacrifices to the ancestors, including canhu beer and agricultural products, to thank ancestors for their assistance in petitioning God for rain and good yields. Petitioners also ask the ancestors to continue their intercession with God so that the rains will continue to the end of the growing season. The endemic poverty and lack of resources in the Gala community frequently prevents conducting more than a single ritual each year. Additionally, strong evangelical Christian

sentiments against traditional beliefs hold more sway in the smaller community of Gala, and thus, may also influence ritual practice. If circumstances force Madjadjane to hold a single rain ritual, this is done in late August or early September at the start of the growing season. During those years, Madjadjane residents still give thanks at a separate first fruits harvest festival but do not conduct a more extensive second rain ritual. A few respondents talked about years when the rain rituals failed because sacrifices were incomplete or unacceptable. In such cases, they said the regulo and elders conducted the ritual at the appropriate time but did not sacrifice a bull, substituted chickens for a missing element, or used alcohol purchased from a store, like vodka or whiskey.

Ritual participants, the regulo and elders, must possess certain kinship and spiritual characteristics. One male elder in Gala—the younger son of a regulo from a nearby community—explained that “in Gala only children of Gala's family can ask for rain, and no one else.” As the ancestral chief of Gala village, Gala's direct descendent family through the male line holds the chiefly power there. Regulos must be of this correct patriline and the eldest living son of the previous regulo, or they will not be recognized by their ancestors. A Madjadjane man elaborated on the second conditional requirement, “There is a new regulo, the younger brother of the Regulo Tembe. It does not rain because the ancestral spirits are angry”. The eldest son of the last Regulo Tembe, who currently lives in South Africa, designated his younger brother to act on his behalf. Although this younger brother is the direct descendent through the male line, he is not the eldest living male of the line and, therefore, not the ancestral spirit-recognized regulo.

Regulos and their families became targets during Mozambique's civil war if they failed to cooperate with patrolling troops, or did not encourage their communities to cooperate. Some died during the conflict, while others immigrated to South Africa or Swaziland. Furthermore, according to Gala's regulo, those regulos that survived the war

and returned may not be as spiritually powerful now even if they are true heirs to this community position. This acting regulo (the younger brother of the regulo) based this on his observations regarding the effectiveness of rituals but did not provide any reasons for why this might be. Regardless, this lack of power affects the regulo's ability to be heard by the ancestors.

Male and female elders in Madjadjane and Gala are important participants in the rain ritual, too. They possess the knowledge of how the ritual is properly done – from choices of sacrificial materials to actual practice within the sacred forest boundaries. In some cases, like the premature death of a regulo, they teach the new regulo how to conduct the ritual.

Before, the old ones, 60-80 years old, made the ceremonies. Now it is the young who make the ceremonies. Therefore, the ancestors are angry. The children are still playing tricks and making jokes. (Madjadjane female elder)

Minimal age and sexual inactivity requirements would seem to ensure that elders who participate in the rain ritual have lived long enough to acquire essential knowledge and experience, and take their responsibilities in facilitating community success seriously. However, past losses of community members during conflict or to disease has reduced the number of people who can meet these requirements, and younger community members may be asked to fill in.

The spiritually wise elders have died. God and the ancestral spirits are angry (Gala Regulo)

Some elders simultaneously lamented that youth no longer participate. Educational and economic opportunities draw many local youth to regional urban centers, adding to the loss of continuity in ritual knowledge and respect for practice.

Disrespect of cultural traditions and institutions by community members contributes to rain ritual

failure as well, according to residents. Examples of disrespectful acts included social, economic, and environmental transgressions.

We do not follow the old rules. There were laws prohibiting some things. For example, when somebody died, people did not go to their fields or cultivate for three days. Now we do not do as our ancestors did. Now there is no respect. (Gala woman)

Later in the interview, she expressed uncertainty about why people stopped following traditional rules. One Madjadjane woman cited participation in the national and global economic market as a reason for ritual failure and drought.

Before they made everything new that they needed. This is what the ancestors wanted, and therefore now it does not rain. The ancestral spirits are angry. We buy products from the store instead of cultivating. It does not rain and the fields do not produce.

Breaking traditional laws concerning resource management and land use—including overharvest of wild resources, overgrazing pasture commons, setting wildfires, and poaching—also leads to rain ritual failure. The ancestors established these laws to provide for the community during both good times and periods of social-ecological change.

In the past, they had good traditional laws and now we don't have them. (Madjadjane man)

Respondents attributed this disrespect towards, and loss of, cultural traditions and institutions to a combination of revisions in national conservation policies concerning resource use and management, a desire to participate in national and global markets, and changing attitudes towards traditional local governance. Some implicated community youth in particular, while others stated that everyone in the community had broken some rule at one time or another for personal gain.

DISCUSSION

Interview respondents explain ritual failures as a result of breaking cultural taboos; however, their reasons also highlight local vulnerabilities rooted in community history and newer economic and environmental policies. Changes to ritual elements directly relate to diminished access to financial and natural capital. Shifts in ritual participants reflect losses in traditional leadership and environmental knowledge, human capital, and political power. Increased disrespect for socio-cultural, economic, and environmental traditions suggests rising community and cultural conflict, which affects social, human, and natural capital over the long term. Environmental stresses resulting from biophysical changes to biodiversity, ecosystem services, and long-term climate patterns have also influenced local vulnerability; however, the data presented here focuses on sociocultural, economic, and political contributions.

The inability to offer an acceptable sacrifice during the rain ritual indicates financial and natural poverty. Cattle represent wealth in Mazingiri Ronga society even though they are not a pastoral culture. Ownership provides households with milk and meat, and families use livestock as loan collateral and to pay for large household costs like school fees, the traditional brideweath *ikulovola*, and emergency healthcare. Rebuilding cattle herds following the civil war has been a slow process for many households. During the war, people lost everything they owned—including livestock—when troops on both sides of the conflict commandeered their animals for food. Families who fled across the border to South Africa or Swaziland and took their herds could not bring the animals back due to regulations preventing the spread of livestock diseases. To rebuild their herds and wealth, most households keep goats and trade up for cattle when possible. This practice ensures a relatively large supply of goats, but desirable characteristics for cattle for sacrificial purposes limit choice and increase selling prices. The smaller pool of cattle ensures high prices for owners when community leaders come to purchase healthy animals for sacrifice.

The lack of cattle and lack of financial resources may be further complicated by specific color requirements for bull sacrifices. Junod's historic account of Ronga rain rituals varies slightly from the interview and oral history descriptions given to me during interviews. Junod (1962 [1926]) speaks of a black-colored bull offering. Throughout the southern African region, the black color of a sacrificial bull in rain rituals symbolizes rain-heavy clouds and the fertility the rain will bring (Feliciano 1998, Willoughby 1969). Respondents emphasized obtaining a bull for sacrifice, but failed to mention color preferences. When asked specifically about color, respondents reiterated the need for a healthy bull to be sacrificed, and when possible, a black animal.

Access to communal pasture also varies by community. The open grasslands surrounding Gala provide extensive communal pasture for household livestock, while the woodlands and riverine habitats in Madjadjane limit similar grazing spaces. Madjadjane residents historically grazed their cattle herds on pastures within the reserve. Conservation policy changes now severely limit access to these locations within reserve boundaries, although cattle and goats regularly manage to bypass reserve fences and earn their owners stiff fines when caught. The overall reduction or complete inability to graze limits herd size and, therefore, influences the ability to offer acceptable sacrifices.

Additionally, the availability of local alcohol used in rituals depends on the season, the weather, and wildlife. Canhu beer is only available in January and February, while sura can usually be obtained all year. Both derive from wild plants easily found within the community boundaries, however, high temperatures and low rainfall can negatively impact wild fruit and sap production. Local farmers rarely grow sorghum as it requires substantial effort to protect the ripening crop from seed-eating birds. Historically, children spent all day in the fields scaring off birds. Now that children attend school, an adult must be employed. Curandeiros maintain small patches of sorghum,

usually close to home, for ritual purposes. In this region, however, not enough is grown to produce large amounts of beer. Sugar cane grows in wet areas near rivers and lakes and in wetlands but is often eaten by elephants.

Poverty is a known indicator of vulnerability to climate change (e.g., Eakin and Luers 2006, Werg et al. 2013). Rain brings life to, and supports, the socioecological system in which Mazingiri Ronga live—making rain and rainmaking rituals central to their lives. If the previous year's harvests and profits were small, community leaders may not have enough donations from residents to purchase the required ritual materials. If communities are so poor that they cannot buy or barter for cattle or goats to hold one of their most important rituals—one that supports life for the socioecological system in which they live—clearly capital for adaptation to future climate uncertainty is severely limited.

Political power in communities has changed and traditional leadership is waning due to legacy of colonial policies, loss of traditional leaders during the civil war, and newer government practices which promote power based on political party affiliation and economics over hereditary status. Locally elected village, district, and provincial governing bodies supersede traditional ones, and empower women's and young people's participation. Small community size and perceptions of ability guarantee some overlap between traditional and modern governance at the village level. However, unaddressed tensions between traditional and modern elected officials may go beyond day-to-day governance and negatively impact vulnerability to ongoing and future climate changes. Emergency and disaster management studies identify competent leadership as a key factor to success during periods of uncertainty and list a range of skills such leaders should demonstrate. These skills include decisiveness, situational knowledge, good communication, adaptability, and ability to manage and motivate others (Hayes and Omodei 2011, Kapucu and Van Wart 2008). Elected officials and substitute *regulos* can certainly possess these

leadership qualities and skills, yet—in communities where traditional cultural practices remain strong and rain ritual practice continues—*regulos* with the correct ancestral credentials are still seen as the most capable even when they are not. Loss of spiritual power might be the phrasing locals are using, in part, to describe this lack of leadership qualities.

Despite efforts to pass along traditional environmental knowledge in Madjadjane and Gala, traditional knowledge continues to disappear. As one person stated, the “old people who knew the ceremonies are gone.” Ritual participation of elders who are not sexually active requires that very old people with lots of experience be around. These men and women carry the knowledge of proper ritual form, as well as other important local environmental knowledge and have experience in dealing with change. This environmental knowledge is increasingly recognized as a major component of adaptive capacity and essential to climate adaptation success (Murphy et al. 2016; Williams et al. 2015). Elders carry communal history, strategies, and knowledge in cultures lacking a written language and in cultures with limited or no access to climate information. Although the world is rapidly changing and old responses may not work in the face of stronger, more frequent droughts and floods, this knowledge base is key to developing locally appropriate and successful strategies using new technologies and knowledge. A secondary aspect of this knowledge loss is seen in the disrespect of traditional laws. Many cultural institutions and rules emerged from social and ecological interactions to fit local parameters. Even if these parameters are changing, some of these parameters—such as shared grazing commons or harvest of wild resources—reflect historic communal management.

Conflict between residents, often created when people disrespect cultural norms and community rules regarding resource management, impacts social networks and human capital. A Gala woman said,

There are contradictions because now we have many chiefs, many parties. In the past, there was

only one chief, one rule. The ancestors and God do not like it. Each one pulls for themselves and thinks only about their own interests.

Community level responses to climate events like droughts or floods, and adaptation to long-term climate shifts, requires people to work together towards common goals. In Matutuine District, limited transportation and outside resource access mean households often pool resources and share information during stressful times. Thus, community conflicts, pursuit of personal interests, and contradicting messages from multiple government levels can generate vulnerability. Intergenerational conflict, influenced by pursuit of opportunities outside the community and disrespect of local traditions, may prevent the best use of human skills and resources during periods of rapid change and stress. Youths who leave a community for work or additional education cannot directly assist with their labor, energy, and technological skills in local efforts to respond to climate events, to mitigate changes, and to adapt to ongoing and future climate shifts. However, any remittance payments they send, after covering personal living expenses, can help pay for materials and labor used in household and community climate projects. Furthermore, intergenerational conflict can impede transmission of local environmental knowledge useful for fine-tuning new technologies and knowledge brought into a community to respond to, mitigate, and adapt to climate uncertainties.

Shifting circumstances ensure the dynamic nature of community and household vulnerability to climate, and the measurement of vulnerability presented here reflects the experiences of one particular moment in time. The 2007-2008 drought ended, but subsequent droughts—including a severe, El Niño-influenced drought lasting from 2014-2016—continue to affect household production and vulnerability in Matutuine District. With these limitations in mind, my follow up fieldwork with local residents has focused on documenting ongoing social, political, environmental, and economic changes to capture a

more dynamic view of community and household vulnerability and resilience. It would also be useful to explore Ronga rain rituals practice across a wider range of communities in Matutuine District. Dissimilarities in community size, population structure, proximity to international borders, protected area boundaries, and employment opportunities, and respect for traditional authority will affect local vulnerability differently than in Madjadjane and Gala despite a shared culture and regional history.

CONCLUSION

Regional and national vulnerability indices identify Mozambique as climate vulnerable and provide information for targeting adaptation aid and disaster relief programs. However, successful climate adaptation for Matutuine District's residents relies upon a deeper understanding of how vulnerability differs within and between their communities. In this paper, I have described rain rituals practiced in Madjadjane and Gala, Mozambique, as related to me by participating elders and chiefs. I then analyzed and contextualized the reasons residents offered for ritual failure as I explored this ritual as a proxy for community vulnerability. In Matutuine District, ongoing changes to traditional rain rituals are rooted in the local context and reflect locally important historic experiences and contemporary conditions that impact both community ritual performance, and community and household climate vulnerability. In combination with more quantifiable vulnerability indices, examination of rain ritual performance changes captures a wide range of information in a culturally appropriate and locally-grounded manner. As such, this ethnographic inquiry into Ronga rain ritual performances provides a contribution towards assessing local capacity in Matutuine District to respond successfully to current and future climate uncertainty.

Climate change is, and will continue, to affect communities around the world. Rain rituals may make no sense to outsiders; however, their practice exposes multiple stressors on a community because

local vulnerabilities becomes most visible during the ritual. Respectful dialogue with community members regarding their ritual practices—rather than shrugging them off as something uninformed people do—provides practitioners an emic understanding of community vulnerability and climate change’s causes and impacts. When paired and/or contextualized with complimentary knowledge of ongoing social, economic, political and environmental changes, this could identify sources of climate vulnerability in the local context, and assist in the development of locally-appropriate adaptation solutions. In this regard, ritual study provides a highly efficient and effective heuristic for framing climate change impacts and capturing key biophysical, socio-cultural, and economic factors that influence the success of household and community adaptation to ongoing and future climate uncertainty. Given the urgency and uncertainty of global climate changes, this is a tool we should not ignore.

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