

Beyond Challenges in Community-Based Adaptation: Critical Insights from the Human Ecology Framework

Hannah M. Barrowman¹

Centre for Deliberative Democracy and Global Governance, University of Canberra, Australian Capital Territory, Australia.

James R. A. Butler

Sustainable Pathways Program—Land and Water, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Queensland, Australia.

Abstract

Community-based adaptation (CBA) is a common policy response in international development yet often encounters challenges with implementation and longevity. Using a human ecology and systems thinking framework and data from the Climate Change Adaptation Project (CCAP), implemented in Akar Akar village, Indonesia, this study explores the drivers of challenges affecting CBA. Results demonstrate that challenges affecting CBA are numerous, interconnected, and can derive from the disconnect between the world views of implementors and the politics, social structures, and historical processes influencing local activities. Challenges encountered in the CCAP project, for example, were found to derive from the implementors' emphasis on agency, self-organization, and responsabilization of women as a way to alleviate community poverty and improve adaptive capacity and its failure to comprehend the sociopolitical position of women in Akar Akar. With these findings in hand, this study advocates the use of systems thinking in future CBA research and intervention design.

Keywords: adaptation challenges, Climate Change Adaptation Project, community-based adaptation, human ecology framework, Indonesia

Introduction

Community-based adaptation and emerging challenges

Community-based adaptation (CBA) is now a common policy response in international development efforts in mid- to low-income nations considered vulnerable to climate change (Kirkby et al., 2015), including Indonesia. CBA can be

1 Corresponding author: hannah.barrowman@canberra.edu.au.

defined as adaptation—“an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities” (IPCC,² 2014, p. 838)—that operates at the community level and is “based on community priorities, needs knowledge and capabilities” (Reid et al., 2009, p. 1). The guiding premise behind CBA is to equip communities with the information and tools necessary for them to make decisions and take action that will increase livelihood resilience to climate change and contribute to their well-being over the longer term. While CBA aims to be community-driven and bottom-up, in practice it tends to be driven and supported by external organizations—namely nongovernmental organizations (NGOs) and donor organizations (Osman-Elasha & Sanjak, 2008).

With increasing application of CBA across different geographical contexts, it has become apparent that there are numerous challenges facing CBA, which may delay or prevent desirable adaptation outcomes (Spires et al., 2014). This is not a novel claim but one that has been, and continues to be, actively scrutinized in both the CBA and broader climate change adaptation literatures. Scholars have found, for example, that CBA is often constrained by the small-scale, short-term, and stand-alone nature of such projects and the artificial channels of resources and support (i.e., delivered through donor agencies and not through existing government mechanisms), which are effectively cut off when projects end (Simane & Zaitchik, 2014). Others have found that external groups tend to utilize the notion of “community” in project design, rendering CBA activities ignorant of or unable to deal with surrounding social dynamics, power imbalances, and the personal interests of particular groups, as well as the changes that are currently taking place in traditional structures and norms (Dumaru, 2010; McNamara & Buggy, 2017). Genuine collaboration among stakeholders to facilitate CBA has also been found to be difficult to achieve due to entrenched government planning processes, vested political interests, and rapid change (Butler, Bohensky, Suadnya, et al., 2016; Butler, Suadnya, et al., 2016; Butler et al., 2015).

Such studies have been important in directing research efforts towards more appropriate solutions in CBA, such as the need to consider traditional power dynamics that exist at the local level (Ensor et al., 2018; McNamara & Buggy, 2017), to work with local institutions such as markets (Simane & Zaitchik, 2014), as well as the need to consider how challenges encountered in CBA interact and overlap across scales, from the international to the local (Spires et al., 2014), and therefore require multi-stakeholder collaboration (Butler et al., 2015). However, while taking stock of the nature and extent of challenges is a fast-growing component of the CBA literature, rarely are challenges explored through a systems lens. For the most part, scholarly discussions of challenges encountered in CBA remain fixed on processes

2 Intergovernmental Panel on Climate Change.

and events at a single scale and often fail to acknowledge, at least explicitly, the causal linkages between local-level challenges and broader-level geopolitical and economic activities (Butler et al., 2014).

We argue that such a framing and analysis is now essential for the CBA field if more effective and sustained adaptation is to occur. In this paper, we present a human ecology framework for assessing CBA challenges: one that embraces a systems approach in research and focuses not only on the phenomena of concern (i.e., CBA challenges), but also on the causal linkages and interrelationships that exist between them.

The human ecology framework

What is human ecology?

Human ecology is a research discipline concerned with understanding the interrelationships between humans, their cultures, and their ecosystems (Dyball, 2010), and some of the earliest attempts to integrate social determinants into assessments of natural hazards and disaster risk reduction can be found in the work of human ecologists (see Pelling, 2001). The field has progressed significantly over the past century, and while early contributions in human ecology emphasized environmental variation as a key causal mechanism influencing social change, vulnerability, and adaptation, contemporary human ecologists have adopted a more systems-based approach whereby humans and their environment exist as “parts of a single, complex interacting system” (Dyball, 2010, p. 12), rather than as separate entities. Dyball and Newell (2015) go further and identify four broad and categories of variables, or subsystems, of the human ecological system: (1) the state of the environment; (2) the state of human health and well-being; (3) the state of community; and (4) the state of cultural paradigms. Table 2 describes these subsystems in greater detail and draws links between human ecology and the CBA research agenda.

According to Dyball and Newell (2015), these subsystems interact with one another through feedback processes that constrain, adjust, and/or reinforce each other’s quantity and extent, and thus the behavior of the system as a whole. As such, the broader human ecological system can be seen as existing primarily as a feedback system and definable not necessarily by its parts but by the way its parts interact across time and space. To analyze this complex human ecological system and its interacting parts, Dyball and Newell (2015) develop the Cultural Adaptation Template (CAT), which promotes “feedback-guided analysis” as a means of understanding change in complex human ecological systems and suggesting points of appropriate and just interventions. The CAT applied in our study is presented in Figure 1 and detailed in Table 1.

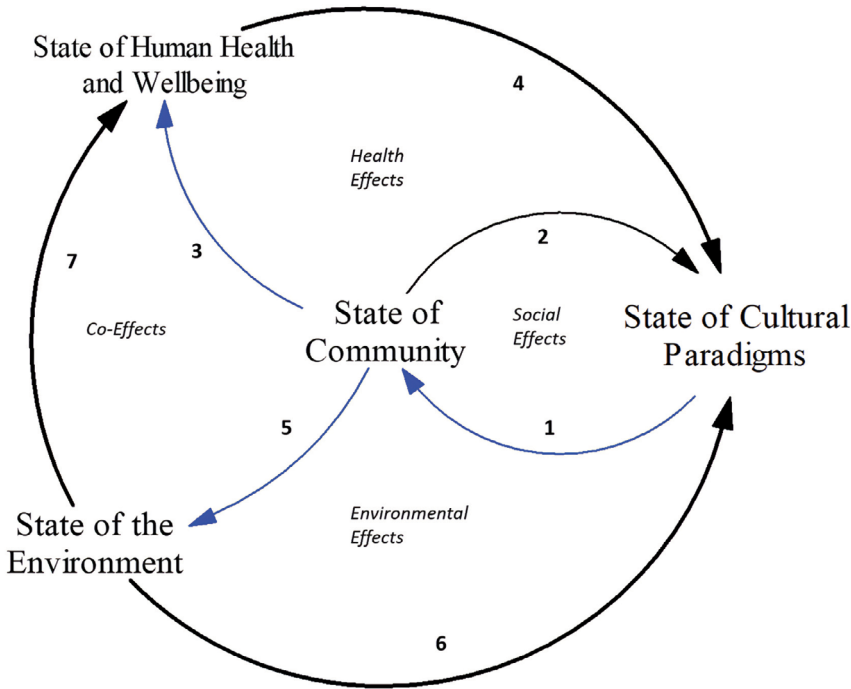


Figure 1. The human ecology framework, also termed the Cultural Adaptation Template (CAT). See Table 1 for descriptions of the links.

Source: Adapted from Dyball and Newell (2015).

Table 1. Description of links between the different variables (or states) in the CAT. See Figure 1 for linkages.

Link	Process or interaction represented by link
1	The influence that a cultural paradigm has on the state of institutions. This may include the nature of and the way in which particular paradigms construct policy and plans, and help societies determine right from wrong (e.g., bureaucratic or legislative norms towards issues of corruption and clientelism, and stereotypes and prejudices around gender or class). These affect cognitive biases (or framings of logic), intergroup relations, trust, and social cohesion needed to support collective and collaborative actions.
2	The process of observing and learning from past experiences. As societies learn from experiences, they may question, reinforce, or alter the dominant paradigm under which they work. The questioning of dominant beliefs, or making them redundant, allows new institutions to emerge and take shape.
3	The effects that human rules and institutions may have on an individual or a society's health and well-being, including physical and psychological stress.
4	The process of observing and learning from rules and institutions, and their impacts. As individuals and societies reinforce or modify their institutions, dominant paradigms may shift, and new ones may emerge. As with Link 2, this process may lead to the emergence of new paradigms with which to guide society.
5	The implications and/or benefits that human rules and institutions may have on the biophysical environment, including natural ecosystems, the climate, and essential life-sustaining systems.

Link	Process or interaction represented by link
6	The process of observing and learning from environmental change and human impact. As ecosystems change, adapt, or degrade in response to human rules and institutions, dominant paradigms may be reinforced or questioned, resulting in the perpetuation of paradigms or the emergence of new ones.
7	The direct effect that environmental conditions have on human health and well-being, including the availability of natural resources and ecosystem services, and the intrinsic conditions providing for the maintenance of culture and identity.

Source: Adapted from Davila (2018).

Human ecology and community-based adaptation

Building on Table 1 and the theoretical framing outlined by Dyball and Newell (2015), human ecology is used here as an analytical framework to capture those variables that influence or result in challenges encountered in CBA, be they underlying paradigms, human institutions, or ecosystems (Figure 1 and Table 1). We work with the four generic variables considered important under the human ecology lens—cultural paradigms, community, the environment, and human well-being—and align these with the major elements of the CBA approach (Table 2). By highlighting the complementarities between human ecology and CBA, we hope to not only examine the complex nature and systemic drivers of challenges in CBA, but to also highlight why human ecology and the systems approach may play an important role in future CBA research.

Table 2. Description of the four human ecology categories and their specific relationships to CBA.

State of cultural paradigms	Describes the collectively held knowledge, beliefs, and values that govern society's judgments. Importantly, these values or belief systems may be held and shared collectively, by a broader community, or they may instead be held by a small but powerful group of elites who use paradigms, or discourses, to extend control over marginalized and oppressed groups.
<i>relationship to CBA</i>	Cultural paradigms or framings of the climate change problem give rise to different conceptualizations of vulnerability which, in turn, determine the nature of adaptation activities to be carried out, at what scale, and who should be involved.
State of community	Describes the formal and informal institutions or social rules that guide collective action and everyday life. Formal rules can be thought of in terms of the state-based institutions as well as state-enforced rules. Informal institutions relate to the socially shared rules, usually unwritten, that are communicated, created, and enforced outside officially sanctioned channels (Helmke & Levitsky, 2003).
<i>relationship to CBA</i>	CBA relies on formal institutions to build an enabling environment. By prioritizing adaptation or other national issues, formal institutions can work to support or constrain adaptation opportunities and activities at the local level. Similarly, informal institutions can help to guide and normalize new, adaptive behavior, as well as constrain such behavior. Both formal and informal institutions can work to promote or restrict inclusive forms of decision-making at the local level and thereby discriminate against, either positively or negatively, marginalized or minority groups including women, children, disabled groups, or religious or ethnic minorities, potentially leading to maladaptation.

State of the environment	Describes the state of the biophysical system and its elements, including both the natural environment and its man-made features such as transport infrastructure, buildings and urban spaces, and agriculture landscapes.
<i>relationship to CBA</i>	The capacity of local communities to adapt to a changing climate is linked to, among other things, the biophysical environment (natural and man-made), and its health. Natural environments provide buffers against climate change impacts including sea level rise, storm surge, and coastal flooding, and thus the health of the natural environment is integral for vulnerability reduction and effective adaptation. Similarly, man-made physical infrastructure maintains and improves access to important resources that may be scarce during times of hardship. At the same time, physical infrastructure may degrade the health of natural environments, such as new roads degrading storm-buffering mangrove forests, increasing societies' vulnerability to storm damage.
State of human health and well-being	Describes all of those factors that constitute "living well." This includes indicators of good health, such as adequate nutrition, as well as indicators of well-being, such as mental stability, identity, and cultural health.
<i>relationship to CBA</i>	The capacities of local communities to adapt to climate change is dependent on, among other things, a community's physical and material capacity to make necessary and sometimes substantial changes to their livelihood or lifestyle. Human health and well-being are projected to be significantly impacted by climate change due to the expansion in distribution of vector-borne diseases, increased heat stress, and reduction in crop production and nutrient value of crops.

Source: Author's summary of approach.

The aims of this paper are: (1) to apply the human ecology framework (Table 1) to develop novel understandings of the nature of challenges encountered in CBA, including their drivers and impacts, and (2) to demonstrate the usefulness of the human ecology framework for future research on CBA. Here, we are particularly interested in demonstrating how human ecology may elucidate systemic drivers of local challenges encountered in CBA. To test our approach, we use a CBA case study recently implemented in villages on the island of Lombok, Nusa Tenggara Barat, Indonesia: the Climate Change Adaptation Project (CCAP). The rest of the paper is organized as follows: In the next section, we describe the case study in which this research is set, introduce the CCAP, illustrate the CCAP's mental model of the Akar Akar social–environmental system, and describe how the system would, ideally, respond to the CCAP team's intervention. The research methods are then outlined and, following on from this, the four system states of the case study are described. Their relationship with one another is then analyzed and discussed and contrasted to the mental model set out in Figure 3. The paper concludes by highlighting the novel contributions this study provides to the CBA literature and the opportunities the human ecology framework has for future CBA research.

Case study and research methods

Case study: Climate Change Adaptation Project in Akar Akar, Nusa Tenggara Barat, Indonesia

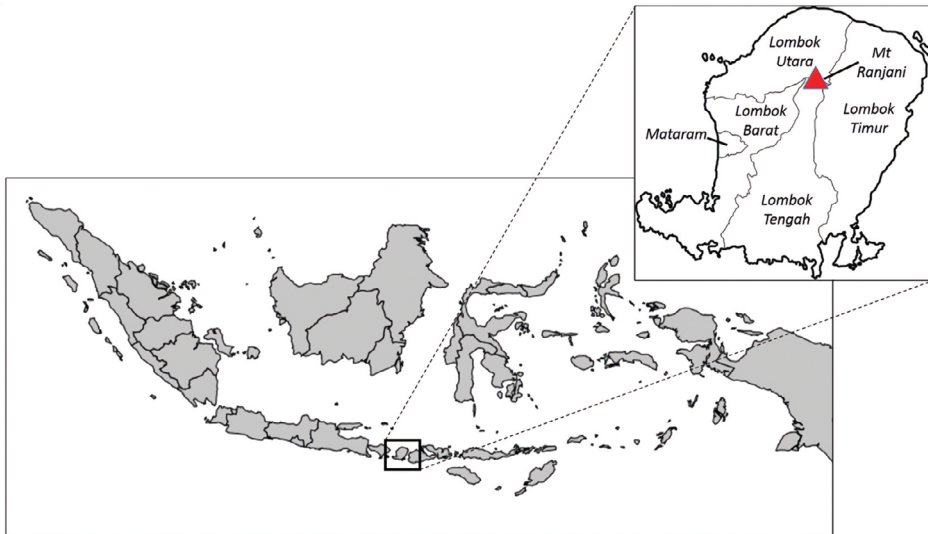


Figure 2. Map of Indonesia showing Lombok Island and the district government boundaries of Lombok.

Source: Authors' own.

Akar Akar village, Lombok Utara

Akar Akar is located in Bayan subdistrict, Lombok Utara district, in Indonesia's eastern province of Nusa Tenggara Barat (NTB) (Figure 2). Like much of the province, the climate of the Bayan is tropical and strongly influenced by the Asian monsoon, which produces wet and dry seasons, and the El Niño Southern Oscillation weather phenomenon, which generates drought periods or wetter-than-average years. The presence of Mount Ranjani creates a microclimate for western and northwestern parts of Lombok Island, including Akar Akar village, that has relatively wetter conditions than eastern parts. Climate projections suggest that annual rainfall in this area could decline significantly (McGregor et al., 2016), and the wet season may become truncated, resulting in negative impacts on water availability and agriculture (Kirono et al., 2016).

According to the last national census data (Badan Pusat Statistik, 2010), Lombok Utara had a population of just over 200,000 inhabitants. The predominant language is Sasak, however Bahasa Indonesia is also widely spoken, particularly with outsiders. Though Islam remains the dominant religion in Bayan subdistrict, many residents throughout the area, including those in Akar Akar, are characterized as *Wetu Telu*,

or “three prayers” (Budiwanti, 2014). Wetu Telu practice a less orthodox version of Islam whereby they pray three times a day and remain more concerned with ancestry worship, local spirits, and supernatural powers residing in certain objects and locations (Budiwanti, 2014). Akar Akar village is headed by a *kepala desa* and governed by a village government.

Livelihood systems in Akar Akar rely heavily on agriculture, and cassava is the predominant crop type. Income for agriculture is sometimes supplemented by seasonal migration of people to urban areas in Indonesia, but unlike many other parts of Indonesia emigration to other nations for labor is not a dominant livelihood strategy.

Climate Change Adaptation Project (CCAP)

The CCAP was implemented between 2010 and 2014 (see summary in Butler, Bohensky, Darbas, et al., 2016). Adaptation strategies were designed and implemented across NTB province, with a majority on Lombok Island. The CCAP differed from a typical CBA project in that it focused on building the adaptation planning capacity of government, universities, civil society, and private sector groups operating at different jurisdictional levels. In particular, it aimed to build the capacity of local researchers to become “system-thinkers” and “change agents,” who could then integrate climate change and adaptation considerations into future development initiatives in the region. This multi-stakeholder platform helped to engage stakeholders, from the village to the international level, to identify livelihoods most vulnerable to future changes in climate in NTB; codesign appropriate adaptation strategies, which could be mainstreamed into development planning at national, provincial, and local levels; provide evidence-based climate adaptation policies linked to poverty alleviation; and trial novel adaptation strategies in vulnerable villages.

Different adaptation strategies were trialed in different villages (Butler, Bohensky, Suadnya, et al., 2016). In Akar Akar, the CCAP introduced a cassava-processing project. On top of reducing the vulnerability of Akar Akar to the increasing risk of drought (e.g., by shifting local diets away from rice and towards cassava), this strategy also aimed to provide additional income for local women (through the selling of processed cassava) and improve nutrition by diversifying local diets. This strategy involved three main activities: (1) training in food processing and packaging; (2) distribution of cassavaprocessing equipment to local households; and (3) the development of a local women’s group to help support participating women. A mental model (schema) of the CCAP’s adaptation strategy in Akar Akar, in the form of a systems diagram, is presented in Figure 3 and the ideal processes taking place between each variable are described in Table 3. This systems diagram demonstrates how the system would behave, under ideal circumstances, after the intervention to empower women and build broader adaptive capacity is undertaken. Study results (described in the following section), which depict what actually took place, contradict this schema.

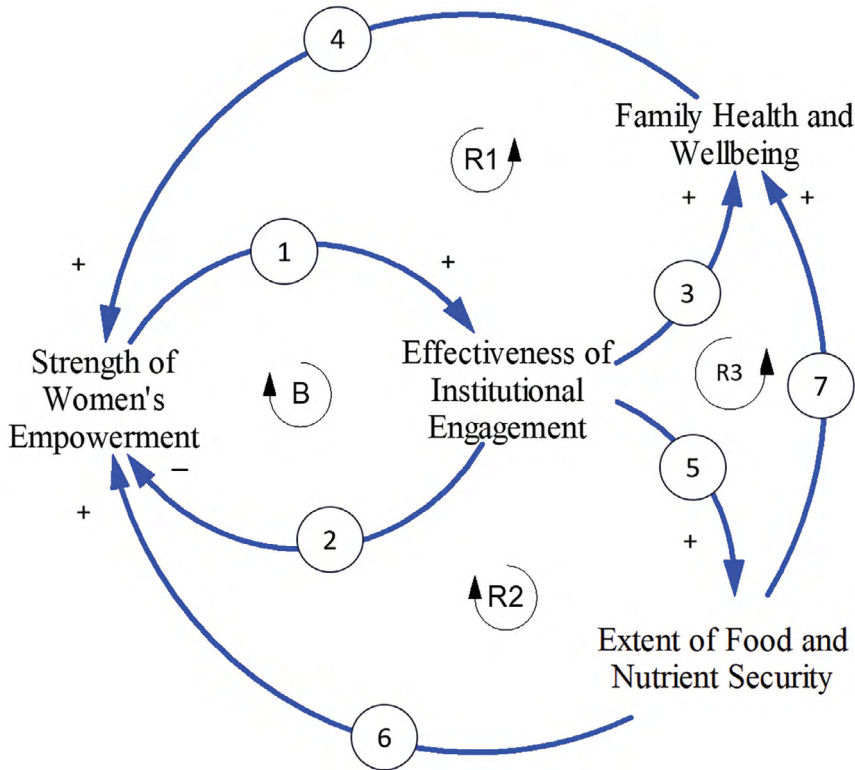


Figure 3. A systems diagram representing CCAP's mental model of the Akar Akar social–environmental system and how it would respond to the team's intervention.

Table 3 below describes the ideal processes taking place.

Source: Authors' representation.

Table 3. Description of processes (links) represented by arrows linking categories of variables indicated in Figure 3.

Link	Process or interaction represented by that link
1	The process of empowering women (through collective decision-making and income generation) is believed to lead to a change in the formal and informal institutional effectiveness in the same (+) direction—that is, increasing it.
2	<p>The process of observing increased institutional effectiveness—as indicated by success in developing collective behavioral guidelines, support, market engagement, and policies at local and regional levels—changes, in the opposite (–) sense, the belief in further strengthening because at some point, a sense of optimum effectiveness has been achieved and no further strengthening is needed.</p> <p>L1 and L2 form a balancing social effects feedback loop (B) that ensures the system grows to a point of desired climate change resilience, food security, and family health. This system then self-regulates, driving new cycles of corrective adaptive behavior if key variables start to change the system in an undesirable direction.</p>

Link	Process or interaction represented by that link
3	The process of developing effective engaged institutions (e.g., the market and government support) drives change in family health and well-being in the same direction (+). For example, as policies and market incentives encouraging processing of cassava are developed, income from cassava sales increases.
4	The process of observing increases in family health and well-being, such as through observing reductions in levels of poverty and increases in nutrition, drives change in the belief that empowering women is a good idea in the same direction (+)—thereby reinforcing this belief. L1, L3, and L4 form a virtuous reinforcing well-being effects feedback loop (R1).
5	The process of developing effective engaged institutions drives change in food and nutrient security in the same (+) direction, as represented by diversity of crops grown, notably the amount of cassava, and a movement away from reliance on rice.
6	The process of observing successful flourishing of diverse crops feeds back to drive change in the belief that empowering women is a good idea in the same direction (+)—here reinforcing it again. L1, L5, and L6 form a virtuous reinforcing feedback loop (R2).
7	The process of changing the level of food and nutrient security directly effects family health and well-being through the provision of nutrients and dietary diversity, ecosystem resilience, and other environmental services. L1, L5, L7, and L4 form a virtuous reinforcing co-benefits feedback loop (R3).

Source: Authors' summary (see Figure 3).

Research methods

This study relies on data collected from 22 open-ended interviews and two focus group discussions (FGDs). Interviews were conducted with individuals including farmers, local businesspeople, village heads, local government staff (district and provincial levels), local and international NGOs, and researchers. FGDs and interviews were conducted in February and March 2016 and again in February and March 2017. Interviews with those at the village level (e.g., farmers, village leaders, local businesspeople, and local NGOs) were conducted in Akar Akar village, while interviews with government staff, researchers, and staff from international NGOs were carried out in the Mataram, the provincial capital. Interviews were conducted in Bahasa Indonesia and, with the support of a local translator, were later translated and transcribed into English. While interviews required individuals to discuss the opportunities and challenges they had encountered in participating in the CCAP, and in sustaining adaptation strategies beyond the project's lifecycle, FGDs required participants to discuss the expectations they had for CCAP at its commencement in 2011, and then to consider whether these expectations had or had not been met.

Transcripts from interviews and FGDs were coded and analyzed using *NVivo*, a qualitative data processing software program. Data were coded into predefined themes or categories of barriers and challenges that were highlighted or discussed by interviewees. These themes/categories related directly to the categories of the human ecology framework described in Table 2. In order to populate the CAT

diagram, we addressed the overall research question: “with regards to CCAP, what were the challenges that you encountered when trying to implement and maintain the adaptation activities specific to the project?”

In the following section, we summarize the various challenges encountered by different actors in the Akar Akar case study, which is divided into the categories of the human ecology framework. We then populate the feedback system model and discuss the key variables or drivers that are influencing the outcomes of the case study’s adaptation activities.

State of the environment

Changing climate and degrading environmental conditions were the original justifications for the CCAP. Rather than discuss the state of the environment, we take global climate change and associated local impacts (e.g., increases in drought conditions, shifts in seasonal rainfall patterns) as likely, and examine how other system states interact with climate change impacts to affect community vulnerability. Here, we therefore describe the state of the environment as perceived by the project design.

In 2010, when project scoping was being carried out, NTB was considered highly sensitive to climate change. According to the World Food Programme (WFP), climate threats to NTB region, including Akar Akar, included increasingly drier conditions over the coming decades, changes in existing seasonal patterns and an increase in average air temperatures (World Food Programme, 2013). Given the region’s reliance on agriculture for income and subsistence, climate change was expected to have significant impacts on food security through reduction in crop production and increases in the cost of staple, nutritious food (World Food Programme, 2013). These projections were confirmed and refined by subsequent modeling, which showed that Lombok Utara was likely to become one of the most impacted districts in NTB (Kirono et al., 2016; McGregor et al., 2016).

State of human health and well-being

As with the state of the environment, concerns about the state of human health and well-being at the local level in NTB provided justification for CCAP to implement a cassava-processing intervention in Akar Akar village. Again, rather than discuss the state of human health and well-being in Akar Akar, we describe it from the perspectives of CCAP, and examine how other system states interact with health and well-being.

According to the CCAP team, climate change is projected to have a strong impact on crop production in Lombok Utara, particularly rice, potentially resulting in shortages in rice production and increases in local rice prices. The CCAP's multi-stakeholder, codesigned process had identified the diversification of agricultural production as an important "no regrets" adaptation strategy to reduce the community's vulnerability to drought conditions—which particularly affect rice. At the same time, rice was also seen to have less nutritional value than other carbohydrates, such as wheat, corn, and tubers (i.e., cassava, sweet potato, and taro). Indeed, there was a general concern in the project team about the high consumption of white rice in the region and its impact on increasing rates of noncommunicable diseases, such as diabetes, and the lack of diversity in local diets, particularly in poorer rural areas. Currently, 1.3 percent of the population in NTB suffer from diabetes and diabetes-like symptoms, and over 2 percent suffer from coronary heart disease, which is one of the highest rates in the country (Cardiovascular Division & Health Services Research Centre, 2017).

Another justification was concern about the degree of poverty in NTB. Currently, 14.8 percent of the NTB population lives below the national poverty line (Badan Pusat Statistik Provinsi Nusa Tenggara Barat,³ 2018), compared to a national rate of 9.8 percent (World Bank Group, n.d.). By selling processed cassava products, rather than in its raw form, community members and women in particular would be able to generate greater income as well as receive income throughout the year as opposed to only seasonally.

Thus, by encouraging a shift away from a reliance on a rice-based diet, the CCAP process had identified an adaptation strategy which would increase food security, improve the nutrition of local diets, and generate additional income for women and poorer households. However, as is discussed below, this strategy had implications for community members participating in the project.

State of cultural paradigms

To implement the strategy, the CCAP team sought to establish a women's association, which was to become known as "Mekar Makmur," or "women's group," to carry out village-based cassava processing. Through the women's group, women were educated in the importance of nutrition in the family, trained how to use the cassava-processing technology (to make *sawut* or shredded cassava, chips, and flour), and trained in product promotion. A leader was selected to engage with others in the village, when needed, particularly with the CCAP team, village government, and extension officers from the local government (Women's FGD, March 2016).

3 Central Bureau of Statistics, West Nusa Tenggara Province.

According to the CCAP team, women were targeted “due to the fact that all household food activities such as getting groceries, and their distribution, food preparation and processing are their responsibility.”⁴ In this sense, women were therefore seen as “change agents” who could address environmental degradation problems and other social issues including health—an emerging discourse or strategy in international development—helping “diversify their families’ diets and provide alternative employment at home” (CSIRO Land and Water, n.d., p. 7). While the approach was seen as one of “empowerment of the most vulnerable beneficiaries ... including women and children” (Meharg et al., 2015, p. 17), it does, at the same time, force responsibility for the health and well-being of families and the broader community on individual women in Akar Akar.

Such discourses (development through empowerment and self-organization) have been criticized by critical development scholars as taking the “distinctly neo-liberal formulation” of the World Bank (Li, 2006, p. 5), whereby communities of poor, rural, and/or remote people are encouraged to take on the responsibility of their own poverty alleviation by engaging with markets, learning how to conduct themselves in a competitive arena, and making the appropriate and rational choices where needed. At the same time, by focusing specifically on women and using women as tools to achieve project outcomes, the project effectively engaged in determining the role of women in the village. In this case it was the role of overseeing family diets, health, and well-being and, by extension, the community’s health and well-being. In other words, women were seen as mothers and not much else.

As will be discussed below in the “State of Community,” this approach did not have the desired effect on improving health and well-being and, instead, the targeting of women resulted in significant challenges for the project and the continuation of cassava processing.

State of community

In this example, the state of institutions, which relates largely to the state of institutions influencing the social ecological environment, is divided into two subsets: formal institutions and informal institutions.

With regard to the formal institutions, interviews with community members uncovered challenges to gaining and maintaining interest, and therefore support, from local government. For the most part, there was limited formal government involvement in the project, despite government staff participating in meetings and workshops earlier in the CCAP process. Villages highlighted how “they just turn

⁴ Quote taken from a CCAP project proposal to research cassava processing, accessed during the research and now unavailable.

up to meetings,” “only send junior staff,” “never respond to requests for support/resources” (Men’s FGD, March 2016). Some attributed this to the fact that local governments are rarely supportive of or interested in projects that do not align with national priorities. For example, villages highlighted how the government only gave support when projects/activities focused on “priority” crops, namely rice and corn, and not cassava, and, more broadly, focused on economic and infrastructure development. Others highlighted how, by having women run and facilitate the project, it was always destined to fail as “women in the village don’t talk to men from outside the village” (interview with extension officer, Akar Akar, March 2016).

This then relates to informal institutional barriers. In Akar Akar village, women do not usually interact with local government or, more broadly, men from outside the village and, for the most part, it was this subordinate role of women in Akar Akar village that proved to be a major hurdle for both project participants and the project team. For example, during the FGDs, female participants reiterated that “we didn’t communicate with the [local] government at all ... we usually don’t communicate with people outside our village” (Women’s FGD, Akar Akar, March 2016). Upon reflection, the project leader also highlighted that one of the team’s main challenges was the support and drive of the women’s group, mentioning that “in thinking about why the woman’s group is not so successful we realized it was because it’s only woman ... [but] woman don’t know how to go to Mataram, they are very shy and they never leave the village, and never speak out” (interview with project team leader, April, 2016). Indeed, members of the women’s group highlighted how it is not common practice for them, as women, to interact with those in higher or more influential positions or, in fact, anyone from outside the community (Women’s FGD, March 2016). Instead, this type of interaction typically takes place between men. As such, this led to challenges when women tried to obtain new and more appropriate cassava-processing tools and facilities from local government. Rather than engaging directly with government, members of the women’s group had to go through their husbands or other men, delaying the communication process, or curtailing it entirely.

Discussion

This study provides a novel understanding of the nature of challenges experienced in CBA and the drivers of, or interactions between those challenges. In doing so, this study also provides an additional important contribution by demonstrating how the human ecology framework can be used to extend existing framings of problems and solutions in CBA scholarship, and climate change adaptation scholarship more broadly.

The feedback diagram outlined in Figure 3 represents the CCAP's mental model of how the system would behave after the intervention in Akar Akar was carried out. However, as the results from this study highlight, the process of empowering women (L1) was never actually achieved in reality (proving to be a negative polarity) and the ideal outcomes of the intervention could not be met. The following discussion aims to explain why this ideal was never met in reality and starts to link challenges encountered in one state with those challenges encountered in other states. In doing so, the following discussion is able to demonstrate the complexity and multidimensional nature of challenges experienced in CBA.

Subordination of women and vulnerable people through CBA

First, the strength of the “women empowerment” discourse meant that women became the target of the project and the driver for cassava-processing activities going forward. However, as encountered in this study, one of the core challenges highlighted by nearly all participants of the women's group was the lack of access to formal decision-making platforms or to individuals holding influential positions. The limited access they had to local government was exacerbated when women needed new or better cassava-processing technology. The fact that men tended to be the primary actors in decision-making and in communicating and interacting with those from outside the community, including local government, meant that it was difficult for members of the women's group to follow up with other groups/stakeholders on project needs. Therefore, any problem encountered in the project, such as the need for more, or more appropriate, cassava-processing tools and equipment, had to be communicated by women to village men, mostly husbands, and then on to village and district government. The result was that response from government was rare, limited, or ill-informed.

At the same time, the process of responsabilizing women, not only for the purposes of reaching project objectives, but for improving the health and well-being of the community as a whole, is, we argue, not too dissimilar to the various state-based ideologies used to control women throughout Indonesia's recent history (Blackburn, 1994; Hadiwinata, 2003; Purba, 2011). For example, Suharto's political rhetoric of “family unity and strength” was used to reinforce specific gender-based roles within Indonesian families and broader Indonesian society (Purba, 2011). For the most part, this rhetoric had the effect of characterizing the role of women in Indonesian society as mere mothers and wives, whose functions and status were to support their husbands in performing public roles to achieve economic development (Purba, 2011). Such roles oriented around domestic life and tended to be undervalued and had the effect of reducing women's access to higher socioeconomic status and political power in Indonesia, meaning that women experienced greater levels of subordination

and marginalization. Consequently, many women in Indonesia now face social structures that have and continue to disadvantage them in becoming more involved in public affairs, where male domination remains common and uncontested.

During the FGDs, women also discussed the roles that they carried out on a daily basis such as domestic chores of cooking for the family, cleaning the house, and assisting their husbands in agricultural work; all of which were encouraged under the New Order Regime (Berninghausen & Kerstan, 1992; Thorbecke & Pluijm, 1993). Importantly, the project in Akar Akar tried to counteract these roles, at least to some extent, by offering women an alternative and independent means of income generation. In doing so, we argue that this was a key shortcoming of the project design as it purposefully set out to generate women change agents in the community, and manipulated the role of women, albeit through alternative practices and for different goals. Furthermore, by focusing specifically on women, emphasizing women's empowerment and self-organization in this way and ignoring the social dynamics of Akar Akar and their historical roots, the project weakened the capacity of the community as a whole to make or act on decisions. This state is represented by the variable "strength of decision-making mechanisms in the community."

Bypassing local government

Second, by focusing on "autotomising" (Rose, 1999) community residents and researchers, the project essentially reduced the need for local government to be involved in the project, represented by the variable "extent of government involvement in community-based adaptation project." Members of the Akar Akar community found it difficult to generate and maintain interest from local government and were unable to get support when needed. Indeed, this lack of government support is a common outcome for many development projects engaging with the discourse of community self-organization, agency, and responsabilization in poverty alleviation (Harriss et al., 2005; Li, 2006), and in contexts where working with local government is seen as too risky by development partners. Prominent examples of this in Indonesia can be seen in the actions of the international development community in the wake of the Indonesian tsunami in 2004 when the World Bank, and its development partners, used the World Bank's own village funding mechanism—the Community Driven Development program—as the primary vehicle for aid delivery to villages across affected regions of Indonesia. As Cliffe et al. (2003) highlight, such a process has seen the systematic undermining of local government ownership over service delivery in Indonesian villages and has placed subnational governments in a weaker position than their development partners to deal with local development issues (Li, 2006). As a result of emphasizing agency, as can be seen in CCAP's attempt to build researchers' capacity, and not engaging directly with local government and the local politics associated with this engagement (see above), the need and capacity of local government to support project initiatives over the longer term was

undermined. In this study, we argue that this has the flow-on effect of reducing the influence of community decision-making mechanisms, as their calls are not responded to by local government.

We therefore argue that the strength of particular discourses held by the international development community and the limited involvement of the government have had detrimental impacts on the strength of decision-making mechanisms at the local level. In turn, the reduced effectiveness of local decision-making mechanisms has a negative, or negligible, impact on family health and well-being. In turn this increases the reliance on external support in the form of international development. Combined, our results highlight the need for a reorientation of the current CBA discourse held by the international development community away from one that values individual agency and the power of the individual, to one that focuses on the collective or, more importantly, the strengths of current capacities.

Human ecology and future research in CBA

As our analysis demonstrates, the human ecology framework can contribute to the field of CBA, and to adaptation scholarship more broadly. First, it offers a robust tool to systematically characterize challenges encountered in CBA. In turn, this allows for systemic comparison of what works and what doesn't, and the identification of patterns or, more deductively, "deviations" from the norm. More importantly, this human ecology framework holds systems thinking at its analytical core and, as such, it allows the researcher to start analyzing CBA challenges within the broader sociopolitical system in which CBA operates, meeting the call from adaptation scholars for CBA to become more politically aware and politically responsive (e.g., Eguavoen et al., 2014; Eriksen et al., 2015). As we have shown here, while an initial screening of CBA challenges may tell us that, in some cases, women may play a more subordinate role in some contexts and, thus, adaptation actions may be hard to sustain if not inclusive; a more systems-oriented analysis uncovers the discourses at play and the range of processes and practices that are continuing to marginalize already marginalized voices, thus repeating historical injustices (Sovacool, 2018).

Had the CCAP team engaged more with the broader system during the design of this project, they may have been able to realize that their guiding discourses or project assumptions were at odds with the local social and political context. Given that CBA projects will almost always take place in the context of a complex social ecological system, we therefore argue that a variable or system state of interest should never be treated in isolation from other variables. Accordingly, a systems approach should be used in the development and framing of any CBA project and, ideally, this approach should be used alongside strong engagement with the community affected by the intervention, so to establish what *their* mental model of *their* system is. In this way, CBA practitioners may be able to avoid imposing their own discourses or worldviews onto the project logic and avoid "surprising" system responses.

Conclusion

This study has used the human ecology framework to assess challenges encountered in CBA. Importantly, the framework emphasizes the use of a systems lens, which encourages analysis to go beyond singular processes and events and instead examines the causalities of challenges operating at levels far beyond the local. Using this framework, our study provides a novel first step towards uncovering why some CBA interventions may be more sustainable and resilient than others.

The CCAP worked to facilitate nutrition diversity and security and generate greater household income, particularly for women. However, our analysis illustrated how the strategy trialed in Akar Akar met numerous challenges, which were interconnected and derived from the discourses, practices, and world views of groups operating at higher jurisdictional levels. The international development community, for example, with their focus on agency, self-organization, and responsabilization of individuals as a way to alleviate broader social issues, failed to acknowledge the complexities of local politics and social structures, and the historical and political processes which have placed women into particular roles in society. Any CBA project will always take place within a complex social ecological system and, as such, one variable (e.g., women's empowerment) can never be treated or changed in isolation from other variables. We therefore argue that a systems approach should be used in the development and framing of any CBA project. More importantly, this approach should be carried out with engagement with the women and men of "the community" so to establish what *their* mental model of *their* system is. In this way, CBA practitioners may be able to avoid any "surprising" system responses to the intervention and, as a broader research community, CBA scholars may be able to go beyond what we see as and how we treat "CBA challenges."

References

- Badan Pusat Statistik [Central Bureau of Statistics]. (2010). *Sensus penduduk 2010*. Retrieved January 15, 2017 from sp2010.bps.go.id/index.php/navigation/wilayah
- Badan Pusat Statistik Provinsi Nusa Tenggara Barat [Central Bureau of Statistics, West Nusa Tenggara Province]. (2018). *Percentage of poor: Nusa Tenggara Barat Province, 2002–2018*. Retrieved October 27, 2019 from ntb.bps.go.id/dynamictable/2016/07/22/25/persentase-penduduk-miskin-provinsi-ntb-2002---2018-keadaan-bulan-maret-.html
- Berninghausen, J., & Kerstan, B. (1992). *Forging new paths: Feminist social methodology and rural women in Java* (B. A. Reeves, Trans.). Zed Books.
- Blackburn, S. (1994). Gender interests and Indonesian democracy. *Australian Journal of Political Science*, 29(3), 556–574. doi.org/10.1080/00323269408402312

- Budiwanti, E. (2014). The purification movement in Bayan, North Lombok: Orthodox Islam vis-à-vis religious syncretism. In M. C. Ricklefs & B. Lockhart (Eds.), *Between harmony and discrimination: Negotiating religious identities within majority-minority relationships in Bali and Lombok* (pp. 144–162). Brill. doi.org/10.1163/9789004271494_007
- Butler, J. R. A., Bohensky, E. L., Darbas, T., Kirono, D. G. C., Wise, R. M., & Sutaryono, Y. (2016). Building capacity for adaptation pathways in eastern Indonesian islands: Synthesis and lessons learned [Editorial]. *Climate Risk Management*, 12, A1–A10. doi.org/10.1016/j.crm.2016.05.002
- Butler, J. R. A., Bohensky, E. L., Suadnya, W., Yanuartati, Y., Handayani, T., Habibi, P., ... & Sutaryono, Y. (2016). Scenario planning to leap-frog the Sustainable Development Goals: An adaptation pathways approach. *Climate Risk Management*, 12, 83–99. doi.org/10.1016/j.crm.2015.11.003
- Butler, J. R. A., Suadnya, W., Puspadi, K., Sutaryono, Y., Wise, R. M., Skewes, T. D., ... & Ash, A. (2014). Framing the application of adaptation pathways for rural livelihoods and global change in eastern Indonesian islands. *Global Environmental Change*, 28, 368–382. doi.org/10.1016/j.gloenvcha.2013.12.004
- Butler, J. R. A., Suadnya, W., Yanuartati, Y., Meharg, S., Wise, R. M., Sutaryono, Y., & Duggan, K. (2016). Priming adaptation pathways through adaptive co-management: Design and evaluation for developing countries. *Climate Risk Management*, 12, 1–16. doi.org/10.1016/j.crm.2016.01.001
- Butler, J. R. A., Wise, R. M., Skewes, T. D., Bohensky, E. L., Peterson, N., Suadnya, W., ... & Rochester, W. (2015). Integrating top-down and bottom-up adaptation planning to build adaptive capacity: A structured learning approach. *Coastal Management*, 43(4), 346–364. doi.org/10.1080/08920753.2015.1046802
- Cardiovascular Division & Health Services Research Centre. (2017). *Reducing the burden of cardiovascular disease in Indonesia: Evidence review*. The George Institute for Global Health. www.georgeinstitute.org/sites/default/files/reducing-the-burden-of-cvd-in-indonesia-evidence-review.pdf
- Cliffe, S., Guggenheim, S., & Kostner, M. (2003). *Community-driven reconstruction as an instrument in war-to-peace transitions*. (Social Development Papers. Conflict prevention and reconstruction series, no. CPR 7). World Bank Group. documents.worldbank.org/curated/en/307821468764666040/Community-driven-reconstruction-as-an-instrument-in-war-to-peace-transitions
- CSIRO Land and Water. (n.d.). *No regrets – Sustaining adaptive rural livelihoods in Eastern Indonesia: Enhancing the adaptive capacity of rural communities in Indonesia's Nusa Tenggara Barat Province, one of the world's least-developed regions* [Project evaluation brochure]. Commonwealth Scientific and Industrial Research Organisation. wp.csiro.au/r4da/files/2015/09/15-00227_LWF_R4DA_NTB-Indonesia_8ppSummary_WEB_150831.pdf
- Davila, F. (2018). Human ecology and food systems: Insights from the Philippines. *Human Ecology Review*, 24(1), 23–49. doi.org/10.22459/HER.24.01.2018.02

- Dumaru, P. (2010). Community-based adaptation: Enhancing community adaptive capacity in Druadrua Island, Fiji. *Wiley Interdisciplinary Reviews: Climate Change*, 1(5), 751–763. doi.org/10.1002/wcc.65
- Dyball, R. (2010). Human ecology and open transdisciplinary inquiry. In V. A. Brown, J. A. Harris, & J. Y. Russell (Eds.), *Tackling wicked problems through the transdisciplinary imagination* (pp. 273–284). Earthscan Publications Ltd. doi.org/10.4324/9781849776530
- Dyball, R., & Newell, B. (2015). *Understanding human ecology: A systems approach to sustainability*. Routledge. doi.org/10.4324/9780203109557
- Eguavoen, I., Schulz, K., Wit, S. d., Weisser, F., & Müller-Mahn, D. (2014). Political dimensions of climate change adaptation: Conceptual reflections and African examples. In W. Leal Filho (Ed.), *Handbook of climate change adaptation*. Springer. doi.org/10.1007/978-3-642-40455-9_82-1
- Ensor, J. E., Abernethy, K. E., Hoddy, E. T., Aswani, S., Albert, S., Vaccaro, I., Benedict, J. J., & Beare, D. J. (2018). Variation in perception of environmental change in nine Solomon Islands communities: Implications for securing fairness in community-based adaptation. *Regional Environmental Change*, 18, 1131–1143. doi.org/10.1007/s10113-017-1242-1
- Eriksen, S. H., Nightingale, A. J., & Eakin, H. (2015). Reframing adaptation: The political nature of climate change adaptation. *Global Environmental Change*, 35, 523–533. doi.org/10.1016/j.gloenvcha.2015.09.014
- Hadiwinata, B. S. (2003). *The politics of NGOs in Indonesia: Developing democracy and managing a movement*. Routledge. doi.org/10.4324/9780203200124
- Harriss, J., Stokke, K., & Törnquist, O. (2005). Introduction: Politicising democracy. In J. Harriss, K. Stokke, & O. Törnquist (Eds.), *Politicising democracy: The new local politics of democratisation*. Palgrave Macmillan. doi.org/10.1057/9780230502802_1
- Helmke, G., & Levitsky, S. (2003). *Informal institutions and comparative politics: A research agenda*. (Kellogg Working Paper Series, Issue 307). Kellogg Institute for International Studies. kellogg.nd.edu/sites/default/files/old_files/documents/307_0.pdf
- IPCC. (2014). Adaptation needs and options. In *Climate Change 2014 – Impacts, Adaptation and Vulnerability: Part A: Global and Sectoral Aspects: Working Group II Contribution to the IPCC Fifth Assessment Report* (pp. 833–868). Intergovernmental Panel on Climate Change. Cambridge University Press. doi.org/10.1017/CBO9781107415379.019
- Kirkby, P., Williams, C., & Huq, S. (2015). *A brief overview of community-based adaptation* [Briefing paper]. International Centre for Climate Change and Development, Independent University, Bangladesh. iccad.net/wp-content/uploads/2015/12/A-brief-overview-of-Community-Based-Adaptation.pdf
- Kirono, D. G. C., Butler, J. R. A., McGregor, J. L., Ripaldi, A., Katzfey, J., & Nguyen, K. (2016). Historical and future seasonal rainfall variability in Nusa Tenggara Barat Province, Indonesia: Implications for the agriculture and water sectors. *Climate Risk Management*, 12, 45–58. doi.org/10.1016/j.crm.2015.12.002

- Li, T. M. (2006). *Neo-liberal strategies of government through community: The social development program of the World Bank in Indonesia*. (IILJ Working Paper 2006/2: Global Administrative Law Series). New York University School of Law. ilj.org/wp-content/uploads/2016/08/Li-Neo-Liberal-Strategies-of-Government-through-Community-2006-2.pdf
- McGregor, J. L., Nguyen, K. C., Kirono, D. G. C., & Katzfey, J. J. (2016). High-resolution climate projections for the islands of Lombok and Sumbawa, Nusa Tenggara Barat Province, Indonesia: Challenges and implications. *Climate Risk Management*, 12, 32–44. doi.org/10.1016/j.crm.2015.10.001
- McNamara, K. E., & Buggy, L. (2017). Community-based climate change adaptation: A review of academic literature. *Local Environment*, 22(4), 443–460. doi.org/10.1080/13549839.2016.1216954
- Meharg, S., Butler, J. R. A., Kirono, D. G. C., Lazarow, N., Barrowman, H. M., & Duggan, K. (2015). *Evaluating the impacts of participatory planning for urban water infrastructure and rural livelihoods adaptation in Indonesia* [Small Grant Report to the Australia Indonesia Centre]. CSIRO Land and Water. bridges.monash.edu/articles/Report_Evaluating_the_impacts_of_participatory_planning_for_urban_water_infrastructure_and_rural_livelihoods_adaptation_in_Indonesia_/4625884/1
- Osman-Elasha, B., & Sanjak, E. A. (2008). Livelihoods and drought in Sudan. In N. Leary, C. Conde, J. Kulkarni, A. Nyong, J. Adejuwon, V. Barros, ... & J. Pulhin (Eds.), *Climate change and vulnerability and adaptation* (pp. 239–256). Routledge. doi.org/10.4324/9781315067179
- Pelling, M. (2001). Natural disasters? In N. Castree & B. Braun (Eds.), *Social nature: Theory, practice and politics* (pp. 170–188). Wiley-Blackwell.
- Purba, R. E. (2011). Public participation in development planning: A case study of Indonesian Musrenbang. *International Journal of Interdisciplinary Social Sciences*, 5(12), 265–277. doi.org/10.18848/1833-1882/cgp/v05i12/51964
- Reid, H., Alam, M., Berger, R., Cannon, T., Huq, S., & Milligan, A. (2009). Community-based adaptation to climate change: An overview. *Participatory Learning and Action*, 60, 11–31. pubs.iied.org/pdfs/G02608.pdf
- Rose, N. (1999). *Powers of freedom: Reframing political thought*. Cambridge University Press. doi.org/10.1017/CBO9780511488856
- Simane, B., & Zaitchik, B. F. (2014). The sustainability of community-based adaptation projects in the Blue Nile Highlands of Ethiopia. *Sustainability*, 6(7), 4308–4325. doi.org/10.3390/su6074308
- Sovacool, B. K. (2018). Bamboo beating bandits: Conflict, inequality, and vulnerability in the political ecology of climate change adaptation in Bangladesh. *World Development*, 102, 183–194. doi.org/10.1016/j.worlddev.2017.10.014

- Spires, M., Shackleton, S., & Cundill, G. (2014). Barriers to implementing planned community-based adaptation in developing countries: A systematic literature review. *Climate and Development*, 6(3), 277–287. doi.org/10.1080/17565529.2014.886995
- Thorbecke, E., & Pluijm, T. van der. (1993). *Rural Indonesia: Socio-economic development in a changing environment*. New York University Press.
- World Bank Group. (n.d.). *Poverty headcount ratio at national poverty lines (% of population)—Indonesia* [Data set]. Retrieved October 27, 2019 from data.worldbank.org/indicator/SI.POV.NAHC?locations=ID
- World Food Programme. (2013). West Nusa Tenggara Profile. cdn.wfp.org/wfp.org/publications/NTB%20Factsheet%20ENG%2012oct12.pdf

This text is taken from *Human Ecology Review*, Volume 26, Number 1, 2020,
published by ANU Press, The Australian National University, Canberra, Australia.

doi.org/10.22459/HER.26.01.2020.07