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COMMUNITY–BASED ADAPTATION TO CLIMATE CHANGE

A Theoretical Framework, Overview of Key Issues and Discussion Of Gender Differentiated Priorities and Participation

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ABSTRACT

This paper provides a comprehensive overview of the fundamentals of community–based adaptation (CBA) efforts. To start, it develops and describes a framework on adaptation to climate change used as the basis for this research. The paper then defines the characteristics or principles of CBA and describes why it is an essential part of the adaptation process. Following this, it identifies the limitations of or constraints to CBA in practice, including the need to link CBA to the larger adaptation and development processes and discusses institutional arrangements for CBA. The paper also explores institutional barriers to successful adaptation at the community level in more detail, focusing on issues of participation in group–based approaches to adaptation and the extent to which men and women have different priorities or needs for adaptation. The paper concludes with observations on effective types of group–based approaches to CBA and recommendations on how to promote equal participation in community responses to climate change in order to ensure that both men and women increase their resilience to climate change and to maximize the effectiveness of adaptation efforts.

Keywords: gender, climate change, collective action, community–based adaptation

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COMMUNITY–BASED ADAPTATION TO CLIMATE CHANGE

A Theoretical Framework, Overview of Key Issues, and Discussion of Gender–Differentiated Priorities and Participation

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1. INTRODUCTION

Climate change poses great challenges for the rural poor in developing countries who tend to rely on natural resources for their livelihoods and have limited capacity to adapt to climate change (Smit and Piliphosova 2001; UNFCCC 2007). Long–term changes in temperature and precipitation and increases in climate variability and extreme weather–related events are already evident in many parts of the world. It has become increasingly clear that even serious efforts to mitigate climate change will be inadequate to prevent devastating climate change impacts that threaten to reverse many of the economic gains made in the developing world in recent decades. Therefore, individuals, communities, and policymakers must adapt to a new climate reality to increase resilience against future climate change, much of which remains highly uncertain.

Though the literature on climate change adaptation is quite extensive, much of it focuses on policy responses to climate change (either nationally or internationally) or autonomous adaptation at the individual or household level, often leaving out community–level adaptation efforts. However, a small but growing body of literature draws on the literature of collective action and rural development and focuses on collective adaptation efforts of community members for the benefit of a larger group (Adger 2003; Ayers and Forsyth 2009; Dodman and Mitlin 2011). This paper concentrates on adaptation responses at the community level and the context or factors that influence adaptation at this level. In particular, this paper focuses on the ways in which communities organize to adapt collectively to climate change, the extent to which all stakeholders (both men and women) participate in community–based adaptation (CBA) efforts, and the factors that influence how men and women respond to climate change.

This paper highlights the importance of community–based adaptation (CBA) efforts and draws attention to the fact that social differentiation influences how individual community members participate in collective adaptation efforts in order to guide the design of more inclusive and effective adaptation projects and programs. In the following section, this paper defines the characteristics or principles of CBA and describes why it is an essential part of the adaptation process. Section 3 develops and describes a framework for adaptation to climate change used as the basis for this research. Section 4 discusses institutional arrangements for CBA. Sections 5 and 6 explore institutional barriers to successful adaptation at the community level in more detail, focusing on issues of participation in group–based approaches to adaptation and the extent to which men and women have different priorities or needs for adaptation. The paper concludes with

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observations on effective types of group–based approaches to CBA and recommendations on how to promote equal participation in community responses to climate change in order to ensure that both men and women increase their resilience to climate change and to maximize the effectiveness of adaptation efforts.

2. WHY COMMUNITY–BASED ADAPTATION?

While the international community has increasingly emphasized the need for adaptation in recent years and more funding has been made available for adaptation, most efforts to help countries adapt have centered on top–down approaches and policy solutions (Wilbanks and Kates 1999; Reid et al. 2009). However, given that climate change impacts, appropriate responses, and, to some extent, adaptive capacity, are location–specific, adaptation at the community level is critical to the process of adaptation. Community organizing for adaptation to climate change in itself also increases resilience to climate risks by strengthening and expanding social networks and links with supporting institutions (Adger 2003; Tompkins and Adger 2004).

The recent emphasis on CBA in both theory and practice reflects the significance of community–based development efforts (Hickey and Mohan 2004; Dodman and Mitlin 2011), as well as research on participatory disaster risk management (Allen 2006; Mercer et al. 2008; van Aalst, Cannon, and Burton 2008). This paper defines CBA as any group–based approach to adaptation with the following characteristics:

- It requires collective action and social capital.
- It incorporates information about long–term climate change and the anticipated impacts into planning processes.
- It integrates local knowledge and perceptions of climate change and risk management strategies.
- It emphasizes local decisionmaking processes.
- It is in accordance with community priorities and needs.
- It provides poverty reduction or livelihood benefits.

Autonomous adaptation (that is, individuals adapting their behavior according to perceived climate change) is insufficient to address the challenge of climate change. For example, farmers acting individually may choose to expand agricultural production in response to climate change, leading to resource degradation and increasing the burden on other members of the community. To avoid this negative outcome, communities must work collectively to address the many challenges they face. Furthermore, effective autonomous adaptation seldom transpires without some degree of CBA. Collective adaptation influences individual adaptation decisions and resilience to climate change by facilitating information diffusion and risk sharing (Boahene, Snijders, and Folmer 1999; Isham 2002; Fafschamps and Lund 2003; Bandiera and Rasul 2006). Given that adaptation is often location specific, local forums frequently are the best site for co–production of forecasts and discussion of strategies to be taken up by individuals. Valdivia et al.

(2010) found that community workshops helped individuals identify local climate trends and adaptation strategies.

Similarly, top–down approaches may not be in the best interest of the community. In particular, National Adaptation Plans of Action (NAPAs) often fail to adequately include local communities and institutions in the policy–making process and in implementation of adaptation efforts (Agrawal and Perrin 2008). In Bangladesh, for instance, although guidelines for the NAPA process stressed participatory approaches, in practice it became a top–down effort, resulting in approaches to adaptation that addressed sectoral risks, rather than the causes of livelihood vulnerability in local communities (Ayers 2011). Therefore, rather than a purely top–down or bottom–up approach, adaptation requires collective action and coordination between multiple scales, from the local to the international, with significant linkages between institutions at the various levels (Wilbanks and Kates 1999; Adger 2003; Agrawal and Perrin 2008; Ayers 2011).

Climate information is also critical to the process of adaptation and it is the incorporation of information about long–term climate change that sets CBA apart from traditional disaster risk management. Successful CBA incorporates both scientific knowledge of climate changes as well as local knowledge about environmental change and risk management based on past experiences. More local–level data gathering and analysis are needed, given the limitations of and uncertainty in downscaled global and regional climate projections and insufficient data from local weather stations (Wilbanks and Kates 1999; Valdivia et al. 2010). In particular, co–production of knowledge between the local and scientific communities offers great potential to monitor and assess climate and environmental change, to devise appropriate responses, and to build trust in forecast data among local decisionmakers (Carolan 2006; Reed, Dougill, and Taylor 2007; Reed, Dougill, and Baker 2008; Gilles and Valdivia 2009; Valdivia et al. 2010; Newsham and Thomas 2009).

CBA considers local decisionmaking processes in both the design of adaptation strategies and the approach to implementation. This emphasis on decisionmaking suggests that CBA efforts are more likely to be appropriate to the local social, environmental, economic, and political context compared to top–down, one–size–fits–all strategies (Chambers 1983). While community–based initiatives are typically defined as being demand–driven, this paper argues that CBA initiatives may be led or initiated by the state, donors, or national or international NGOs (such as some weather insurance schemes and social protection programs), as long as there is significant involvement of community members in design and implementation of the initiatives.

CBA also influences individual adaptation and resilience to climate change. The literature on the links between social capital or networks and adaptation to climate change suggests a rather complex relationship. Several studies have found that social networks help individuals adopt new crop varieties or types (Boahene, Snijders, and Folmer 1999; Bandiera and Rasul 2006) and fertilizer (Isham 2002) by facilitating information diffusion. Other studies have shown that social networks provide a form of informal insurance following shocks (for example, Fafschamps and Lund 2003). Such studies suggest that groups may play a positive role in increasing individual resilience to climate change. However, two recent studies suggest that while social capital encourages the private adoption of some

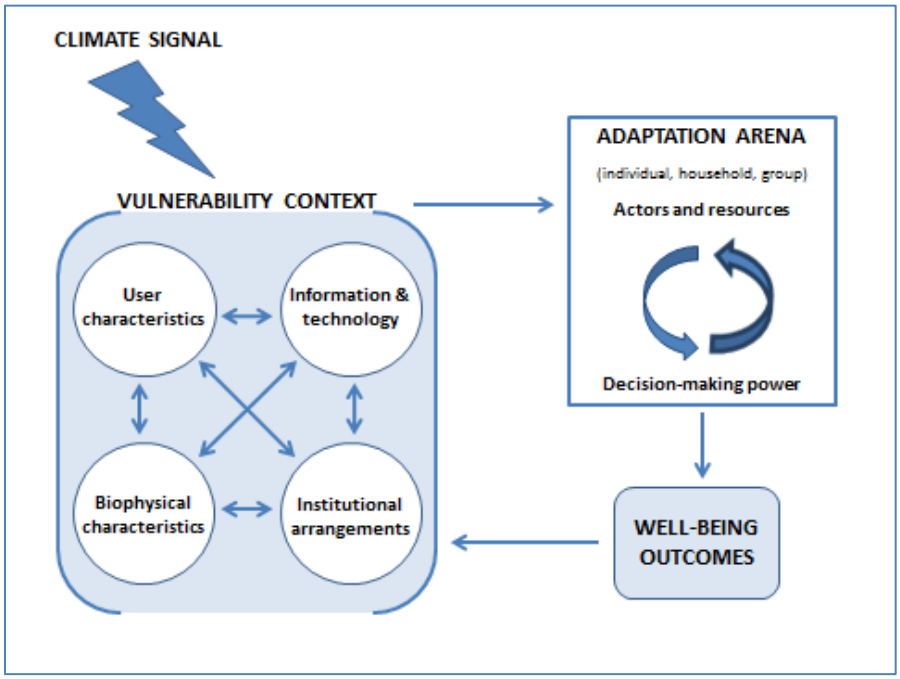
adaptation strategies, it either does not influence or negatively influences adoption of others (Di Falco and Bulte 2009; Nam 2011). These studies demonstrate that the influence of social capital on private adaptation decisions depends on the nature of the adaptation measures and that different individuals may have different preferences for collective or individual approaches to adaptation.

Poor people in developing countries face a host of livelihood challenges that complicate the adaptation process. Therefore, CBA must be integrated with other ongoing development, social protection, and disaster risk reduction efforts in order to increase livelihood resilience to climate change (Davies et al. 2009; Heltberg, Siegel, and Jorgensen 2009). This integration in planning and implementation should include climate–proofing elements as well as the addition of climate adaptive strategies. Failure to adequately integrate strategies for development, social protection, disaster risk management, and climate change adaptation may lead to a duplication of efforts and a waste of scare resources, or in the worst case, conflicting outcomes (Lipper and Pelling 2006).

3. FRAMEWORK FOR ADAPTATION TO CLIMATE CHANGE

Adaptation to climate change is a complex, multidimensional, and multi–scale process (Bryant et al. 2000). The extensive literature on climate change characterizes the adaptation process in terms of type, scale, timing, and outcome of the responses, as well as the factors that influence adaptation (Smit, McNabb, and Smithers 1996; Smithers and Smit 1997; Burton, 1997; Bryant et al. 2000; Smit and Skinner 2002; Agrawal and Perrin 2008; Heltberg, Siegel, and Jorgensen 2009). However, this paper aims to integrate a number of other social issues and factors that all play important roles in CBA, including gender, assets, and institutions. While existing frameworks explore some of these issues, the literature lacks a framework that comprehensively integrates all of these components. Therefore, this paper develops a new framework (Figure 1) that incorporates components reflecting important gender and climate change interactions, drawing on the Sustainable Livelihoods (SL) Framework (DfID 2001), the Institutional Analysis and Development (IAD) framework (Ostrom 2005), the IFPRI Gender and Assets (GAAP) framework (Meinzen–Dick et al. 2010), and the climate change framework of the Third Assessment Report of the IPCC (IPCC 2001).

Figure 1: Gender–Climate Change Framework



Source: Authors

Climate signal: The climate signal comprises long–term changes in average climate conditions, as well as changes in climate variability such as changes in the timing, intensity and duration of precipitation and extreme weather events, like droughts and floods. The response of actors and systems depends on the characteristics of the climate stimulus, including the degree of exposure to the stress and the scale and magnitude of the event (Smithers and Smit 1997).

Context of vulnerability: The impact of climate change on the well–being of individuals, households, and communities and their ability to respond to those changes depends on the context in which climate change occurs (Adger et al. 2009). The context includes all the factors that determine an individual's, household's, group's, or community's vulnerability to climate change. This framework categorizes the main components of the vulnerability as biophysical characteristics, user characteristics, information and technology, and institutional arrangements. All of these components are interrelated, as indicated by the arrows connecting them.

The climate change literature often defines vulnerability in terms of exposure, sensitivity, and adaptive capacity based on the IPCC (2001, 2007). The IPCC definition takes a broad, top–down view of vulnerability in terms of sectors, systems, and regions and characterizes highly vulnerable systems as those that are very sensitive to modest changes in climate, including the potential for substantial harmful effects, and have limited ability to adapt (IPCC 2001). In order to sharpen the focus on human vulnerability, this paper uses the SL and IAD frameworks to describe the determinants of livelihood vulnerability—as biophysical characteristics, user characteristics, information and technology, and institutional arrangements—as well as their interlinkages. Each of these components is further defined below:

- User characteristics: Some actors or groups can be considered more vulnerable to climate change impacts given their livelihood activities, assets, social characteristics, and cognitive ability. For example, those that rely on natural resources for their livelihoods may be more sensitive to climate change impacts. Other constraints include lack of availability or access to financial resources or assets to adopt practices that would minimize the risks of climate change (Brouwer et al. 2007; Gbetibouo 2009; Deressa 2009; Bryan et al. 2013). For instance, in Kenya, several communities expressed a desire to develop irrigation infrastructure in response to changing climate conditions but lacked the financial resources to invest in such measures (Bryan et al. 2013).

  Other users may face difficulties in pursuing particular adaptation options by a lack of access to or control over assets or social status, which further constrains their control over assets. Gender, in particular, is one user characteristic that may have profound impacts on individuals' ability to cope with climate change, a theme this paper returns to in later sections. This paper defines assets to include the following categories of tangible and intangible assets: natural resource capital, physical capital, human capital, financial capital, social capital, and political capital (DfID 2001; Meinzen–Dick et al. 2010).

  The vulnerability and adaptive capacity of particular users also depends on the cognitive and normative factors (Grothmann and Patt 2005; Ostrom 2005; Frank, Eakin, and Lopez–Carr 2011; Jones and Boyd 2011; Reser and Swim 2011). Cognitive factors include the ability to perceive the risks posed by climate change or unwillingness to accept the need to act in response to climate risks (Grothmann and Patt 2005; Maddison 2007; Hamilton and Kasser 2009). Normative factors refer to social or cultural norms of behavior or beliefs that may limit adaptation, despite adequate awareness and knowledge (Ostrom 1990).

- Biophysical characteristics: Biophysical characteristics refer to the sensitivity of physical and ecological systems, which defines the natural limits to adaptation. In the climate change literature, these natural limitations are often viewed as thresholds beyond which change becomes irreversible and limits the ability to adapt (Fischlin et al. 2007; Stern 2007). That is, climate change may alter ecosystems beyond the point at which human activities can be supported (IPCC 2007). For example, water availability may decline to an extent that makes certain types of agricultural production nearly impossible. These changes in biophysical systems have profound effects on the individuals, households, or communities that access and depend on those resources. Moreover, climate change may exacerbate tensions between environmental conservation and ecosystem services on the one hand and agricultural production and food security concerns on the other (Robertson and Swinton 2005; Scherr and McNeely 2008; Power 2010).

- Information and technology: The ability and nature of the adaptation response depends on an individual's, household's, or community's access to information about climate risks and the appropriate responses. While many communities have developed their own systems for monitoring climate conditions, this information may not be adequate to inform adaptation if the climate changes in unprecedented ways. For example, farmers in Burkina Faso traditionally rely on observation of environmental indicators to predict climate patterns, but they have lost confidence in their ability to predict rainfall given increased climate variability and increasingly seek to incorporate scientific information (Roncoli, Ingram, and Kirshen 2002). Socio–cultural changes also account for the shift away from traditional practices such as the use of bio–indicators for agricultural production, even when such practices continue to provide useful information (Gilles et al. 2013). In the absence of credit and insurance markets, climate uncertainty often results in reluctance by farmers to make investments in production technologies, such as fertilizer, which would enable them to improve their well–being over the long run (Dercon and Christiansen 2011).

  Access to climate information and technologies for adaptation is, therefore, essential to enable actors to anticipate long–term risks and make the appropriate adjustments to increase their resilience. However, despite significant scientific gains in predicting the climate, often there is a lack of climate information available at the local level due to uncertainty in climate projections and seasonal forecasts, or due to lack of information on particular climate indicators, such as rainfall variability (Roncoli, Ingram, and Kirshen 2002; Hulme et al. 2005; Vogel and O'Brien 2006). Even when climate information is available, incorporation of scientific climate information into local decisionmaking may not often occur because of the way such information is communicated and disseminated (Patt and Gwata 2002; Vogel and O'Brien 2006). Several studies have shown that there is a need to make climate information more accurate, accessible, and useful for rural communities (Roncoli, Ingram, and Kirshen 2002, Ziervogel et al. 2005, Vogel and O'Brien 2006; Hansen et al. 2007).

  It is also important for scientists and local communities to work collectively to monitor and assess environmental change and come up with solutions to reduce or avoid the negative impacts of such changes (Wilbanks and Kates 1999; Valdivia et al. 2010). However, while co–production of knowledge of climate and environmental change is essential to CBA, the ways in which information is produced and distributed in most cases is far from this principle (Carolan 2006; Reed, Dougill, and Taylor 2007; Reed, Dougill, and Baker 2008; Newsham and Thomas 2009). Moreover, climate information alone will not protect farmers from climate shocks that can have devastating impacts on their long–term well–being—

they also need access to insurance and credit to protect their livelihoods and rebound from climate shocks (Dercon et al. 2004; Carter et al. 2007).

- Institutional arrangements: Adaptation depends not only on access to assets, information, and biophysical characteristics, but must also be viewed within the context of the institutional environment in which it takes place, including the ongoing development process (Smit and Wandel 2006; Jones, Ludi, and Levine 2010). Institutions, including markets, laws, policies, organizations, and social and cultural norms influence how an individual, household, or community perceives, is affected by, and responds to climate change. For example, local organizations have a large influence on how climate risks and impacts are distributed across different social groups and populations (Agarwal and Perrin 2008). More generally, institutions affect the roles governing access to and control over resources and assets for adaptation (Jones, Ludi, and Levine 2010). Social and cultural norms, and other rules governing behavior, influence the extent to which individuals and groups within a community are able to participate in and benefit from collective action (Thomas et al. 2007; Eriksen and Lind 2009; Patt, Dazé, and Suarez 2009; Quisumbing and Kumar 2011).

Adaptation also depends on the institutional capacity of the community. Institutional capacity refers to the degree of social capital in the community, the ability of community members to work collectively, and their ability to access resources and information from higher–level institutions such as government agencies and nongovernmental organizations (NGOs). Many factors, such as the characteristics of the community or group (for example, size, degree of homogeneity, and so on), the ways in which members of the community organize (group type), and the linkages with higher level institutions (for example, with supporting government or donor agencies), influence the effectiveness of collective efforts to adapt to climate change (Ostrom 1990; Rasmussen and Meinzen–Dick 1995; Tompkins and Adger 2004).

Adaptation arena: Adaptation can improve well–being outcomes while reducing vulnerability to future climate change by increasing the ability of actors to withstand climate change and variability, and to moderate and cope with adverse consequences (IPCC 2001). Actors at multiple scales, from the individual to the community, have different perceptions, needs, and preferences; these actors make adaptation decisions given their access to and control over resources (such as assets, time, and habitus) and decisionmaking power (Ostrom 2005). Institutions, the rules of the game, also influence adaptation actions. These institutions can include formal laws as well as social and cultural norms that govern behavior.

In this framework, the adaptation arena is dynamic. The resources to which individuals, households, and communities have access to implement adaptation strategies change over time. Well–being improvements resulting from adaptation decisions taken today may reduce future vulnerability to climate change and variability and give actors more freedom to implement additional adaptation decisions in the future. On the other hand, inability to take protective measures against future climate change and extreme events may reduce well–being and increase vulnerability to future climate change, leaving actors with more limited

space to make adaptation decisions in the future. In addition, the external environment in which adaptation decisions are made is constantly changing. These changes, such as policy shifts, changes in social networks, and changes in the availability of new technologies and information, also affect the ability of actors to make decisions.

The climate change literature classifies adaptation responses according to the spatial scale at which they occur (such as from top–down, state–led investments in infrastructure to community investments in food storage facilities to changes in individual farming practices); intent (either reactive or proactive); timing with respect to the climate stress; duration (short– or long–term); form/type (for example, technological developments, government programs, behavior change, and insurance); and effect (enhanced stability or resilience) (Smit, McNabb, and Smithers 1996; Smithers and Smit 1997; Burton, 1997; Bryant et al. 2000; Smit and Skinner 2002; Agrawal and Perrin 2008; Heltberg, Siegel, and Jorgensen 2009). See Appendix A for some examples of adaptation typologies.

Agrawal and Perrin (2008) group adaptation strategies according to their form or type—mobility, storage, diversification, communal pooling, and exchange—and function with respect to risk (that is, pooling, avoiding, or reducing risk). Similarly, Heltberg, Siegel, and Jorgensen (2009) use a social risk management framework to group adaptation strategies into three categories according to their timing and effect: those that prevent or reduce risk, those that mitigate risk, and those that compensate for risk. The first two are ex ante measures while the third is an ex post measure which they call "risk coping."

Given that adaptation strategies often overlap with development objectives, McGray et al. (2007) place adaptation activities on a development continuum from pure adaptation on the one hand to pure development on the other. On the development side of the continuum, they place measures that reduce poverty and vulnerability; these measures may also help buffer households against climate shocks and changes. On the adaptation side, measures that incorporate information to reduce climate risk or protect against the negative impacts of climate change also have development benefits under future climate changes (McGray et al. 2007).

However, sound development policies are necessary but not sufficient to ensure that development outcomes are achieved under climate change. Adaptation requires more targeted investments in agricultural research, irrigation, rural roads, information technologies, market support, and information and extension services to counter the negative impacts of climate change on agricultural production, food security, and rural livelihoods. These investments should be targeted to regions where the benefits are magnified because of climate change and reduced in areas where climate change impacts are minimal.

This framework takes a wide definition of adaptation, by including interventions that increase the resilience of individuals and communities to changing climate conditions and climate shocks, even if the interventions are not defined in terms of climate change adaptation. Examples of adaptation decisions that are likely to have positive outcomes include changing farming practices, livelihood diversification, asset accumulation and diversification, investments in human and social capital formation, insurance, and natural resource management. Actors with few resources or assets and limited decisionmaking authority are more likely to resort to coping mechanisms in response to climate shocks, such as

reducing consumption and asset depletion, with negative long–term repercussions for their future well–being (Dercon et al. 2004; Alderman et al. 2006; Carter et al. 2007). Some adaptation decisions, such as migration, may also have ambiguous impacts, depending on duration and on whether migrants are able to find employment.

Collective action through local organizations influences the ways in which households and communities respond to and cope with climate risk and is essential to link local adaptation efforts with the larger process of adaptation at higher scales (Adger 2003; Agarwal and Perrin 2008). Links between the local scale and the state enable communities to access resources for adaptation and influence or support state investments in key infrastructure such as irrigation or roads. This framework can be used to explore the implications of various types of institutional arrangements (for example, group–based or community–based approaches) for adaptation and well–being outcomes.

Well–being outcomes: Adaptation decisions (or lack thereof) affect well–being outcomes for individuals, households, groups, and communities. Well–being is viewed in terms of income, basic needs, security of person and property, sustainability, and empowerment/inclusion (DfID 2001; Ostrom 2005). The effect of adaptation on these well–being outcomes depends on the nature of adaptation. For instance, ex–ante adaptation strategies that increase resilience against risks of climate variability and change, such as livelihood diversification or insurance mechanisms, will have positive well–being outcomes. However, ex–post coping strategies, such as asset depletion or reduced investment in human capital (such as keeping children home from school), or mal–adaptations, such as the expansion of agricultural production through unsustainable means, may result in negative outcomes, such as reduced income, resource degradation, and disempowerment in the long run for the actors implementing such measures as well as for others in the community. Well–being outcomes also affect future vulnerability to climate change, and thus, future adaptation decisions.

4. INSTITUTIONAL ARRANGEMENTS FOR CBA

As discussed above, CBA depends on the ability of communities to work collectively through social networks to manage the risks of climate change (Adger 2003; Tompkins and Adger 2004). However, the ways in which community groups organize to collectively adapt to climate change influences the success of these efforts. The literature on the principles for successful collective action for natural resource management sheds some light on the ways in which communities can organize to increase resilience to the shared risks posed by climate change. To the extent that climate change (along with other global changes) intensifies conflicts over resources within communities, strong institutional arrangements supporting collective adaptation efforts may be key to preserving the peace while seeking common solutions to environmental challenges.

This literature highlights several preconditions that influence the success of collective action (Wade 1987; Ostrom 1990; Rasmussen and Meinzen–Dick 1995; Ostrom et al. 1999; Agrawal 2001; Dietz, Ostrom, and Stern 2003). One of these preconditions is that boundaries and rules for collective action are well defined and conform to local conditions; necessary rules include those dealing with the

appropriation and provision of the resource, conflict resolution, monitoring mechanisms, and sanctions for rules violators (Wade 1987; Ostrom 1990). In addition, the rules must also ensure that the benefits to users outweigh the costs of participation (Ostrom 1990; Cox, Arnold, and Villamayor Tomás 2010).

Moreover, effective collective action requires that external agencies recognize the right of communities to organize, and that local organizations are "nested" within other vertical and horizontal governance institutions (Ostrom 1990). The degree of vertical and horizontal linkages to other supporting institutions and governance structures has been shown to be important for the success of collective adaptation efforts (Adger 2000; Tompkins and Adger 2004; Agarwal and Perrin 2008). Such co–management between local and higher level institutions is particularly important for environmental challenges such as climate change that extend beyond the local scale (Ostrom et al. 1999; Dietz, Ostrom and Stern 2003; Tompkins and Adger 2004). These linkages provide local communities with access to funding, inputs, training, and other support for adaptation so that the burden of adapting to climate change does not fall entirely on the communities themselves (Allen 2006). The degree to which adaptation efforts are integrated with economic development, social protection, and risk management is also particularly important if CBA efforts are to maximize poverty reduction or livelihood benefits (Smit and Wandel 2006; Dodman and Mitlin 2011).

Another important principle for effective collective action is that all members of the group participate in decisionmaking and rule setting. However, in practice, the extent to which the needs, interests, and priorities of all members of the community are incorporated depends on local power structures. The literature highlights many cases of collective action for natural resource management or community development in which local elites dominate decisionmaking processes, control over resources, and distribution of benefits (Cleaver 2009, Platteau 2004). However, the problems of elite capture may be avoided through the design of institutional procedures such as democratic election of leaders, investments in capacity–building and information–sharing activities, and incorporation of mechanisms ensuring accountability and transparency (Dasgupta and Beard 2007; Fritzen 2007). Elite capture is not the only concern for group participation in decisionmaking and rule setting. As will be discussed below, gender norms often exclude women from participating in such group decision making and rule setting.

The literature also points to several other factors that may affect the success of collective action, including the size of the group, the degree of heterogeneity of group members, and adaptability of the institution to change (Wade 1987; Ostrom et al. 1999; Agrawal 2001; Dietz, Ostrom, and Stern 2003). However, the extent to which these factors influence the success of collective efforts appears to be contextually driven (Stein and Edwards 1999; Poteete and Ostrom 2004). Again, good institutional design that is suited to the local context may help overcome factors that threaten group effectiveness, such as a high degree of heterogeneity of group members (Varughese and Ostrom 2001).

However, climate change may complicate many of the lessons from the literature on collective action for natural resource management and participatory development. For instance, climate change may introduce new shocks to communities or intensify existing ones, which will pose additional challenges for collective action. For example, through collective action communities may be

resilient to one drought every ten years but may be unable to recover from severe droughts if they occur more frequently. In addition, collective adaptation requires location–specific information on anticipated climate change and appropriate responses which may not be available in many communities. In many cases, climate change may introduce a considerable degree of uncertainty which may complicate collective decisionmaking.

The following sections illustrate how one particular user characteristic—gender—intersects with institutional arrangements for CBA, focusing on the different ways that men and women participate in collective adaptation efforts and their priorities for adaptation. These sections make use of existing literature on adaptation at the community level and the broader literature on development and collective action. Though adaptation and development often encompass related or overlapping processes, this paper recognizes that they are not necessarily related or dependent on each other. Nonetheless, when looking at issues of social differentiation at the community level, the broader development literature provides relevant examples for understanding how different social groups have been included or excluded from community development processes in other contexts. These examples provide a basis for understanding how related issues may play out in the context of community based adaptation, particularly in light of the limited existing evidence base on social differentiation and CBA.

5. ISSUES OF PARTICIPATION IN CBA

The broader impact of CBA will ultimately depend on who within the community is able to participate in CBA strategies. A number of variables, including age, wealth, ethnicity, social status or gender, will shape the ability of community members to participate in CBA strategies (Thomas and Twyman 2005; Eriksen and Lind 2009; Schwartz et al. 2011). Gender—in particular—is an important variable given a growing body of evidence indicating that climate change and climate shocks will differentially impact men and women (Masika 2002; Patt, Dazé, and Suarez 2009; Goh 2012). Further evidence demonstrates that risk is not equally shared between men and women at the household or community levels (Dercon and Krishnan 2000; Duflo and Udry 2003). Literature on climate change adaptation strategies indicates that adaptation is an inherently "political" process in that it produces "winners" and "losers" in terms of distribution of benefits and costs (Adger et al. 2006; Eriksen and Lind 2009). It is important to also remember that neither men nor women within communities have a monolithic set of interests, priorities, or abilities to participate. Thus, social differentiation by economic status, age, ethnicity, and social status is important.

Community members taking part in CBA activities may have differences in the scope of their participation. For example, certain members may disproportionately hold decisionmaking power or control over community assets. Along these lines, Cleaver (2009) argues that development practitioners advocating for participatory natural resource management projects too often overlook the fact that deeply entrenched social institutions and norms may influence which group members will be able to have a voice and ultimately exercise rights.

Evidence indicates that targeting modalities, such as the gender composition of groups used for information dissemination, matter for outcomes of group–based

agricultural technologies (Kumar and Quisumbing 2011). In rural Bangladesh, for example, Quisumbing and Kumar (2011) find women's assets increase more relative to men's when technologies are disseminated through women's groups as opposed to mixed–sex groups. In other cases, mixed–sex groups may be more effective at meeting project objectives, especially when women and men are both key users of a resource. In Bangladesh, Sultana and Thompson (2008) found that compliance with rules limiting fishing in protected areas is higher when both men and women are actively involved in fishery management groups because each has a distinct role. Women, because they control the catches, exert pressure to ensure compliance with fishing rules, while men patrol the fish sanctuaries at night, when it is unsafe for women to do so. In Madhya Pradesh, India, when women belong to forest protection committees, participate in committee meetings, and patrol the forest, control of illicit grazing and felling increases, as does the regeneration of allotted forest (Agrawal et al. 2006).

On a broader level, not all community members will be able to participate in CBA activities in the first place. Many poorer community members may not have access to key complimentary assets, such as land or financial capital, necessary for participation in CBA activities. Empirical evidence indicates that a "gender–asset gap" exists with respect to quantity, quality, and type of assets (Antonopolous and Floro 2005; Peterman, Behrman, and Quisumbing 2010; Meinzen–Dick et al 2010). Many adaption strategies targeted at improving agricultural production, such as tree planting or local seed banks are predicated on the assumption that participants will have secure access to and control over land. Field evidence and statistics available at country and regional levels demonstrate that most land tenure systems are inherently gender–biased with primary rights preferentially allocated to male members of the community (Deere and Leon 2001; FAO 2002, Razavi 2003; World Bank et al. 2009). Several studies suggest that women are less likely to adopt agroforestry systems because they lack rights to plant trees and secure land rights (Fabiyi, Idowu, and Oguntade 1991; Tonye, Meke–Me–Ze, and Titi–Nwel 1993; Diaw 1997; Fortmann, Antinori, and Nabane 1997). Going beyond "tangible" assets, many CBA schemes require access to intangible assets, such as information, social capital, or education. Evidence indicates that women are disadvantaged with respect to human capital across a variety of dimensions ranging from formal education to agricultural extension services (Peterman, Behrman, and Quisumbing 2010; World Bank and IFPRI 2010).

Furthermore, vulnerable community members may face pre–existing time constraints that limit their ability to participate in CBA. For example, women in poor households often have a full load of childcare and domestic responsibilities that limit both their mobility and their free time available to participate in community groups (Meinzen–Dick et al. 2010). Other authors note the role of social norms related to racial or ethnic prejudices in influencing social capital accumulation (Alesina and La Ferrara 2000). In qualitative case studies of adaptation strategies in Kitui and Turkana Kenya, Eriksen and Lind (2009) document ongoing ethnic tensions between well owners, traders, and nomadic Orma and Somali pastoralists over access to wells and grazing area during drought. In this case, community members actually used group–based approaches to mobilize against granting well access to ethnic minorities.

6. GENDERED PRIORITIES FOR ADAPTATION

Community members involved in CBA will be a diverse array of men and women with different resources, opinions, preferences, and priorities. Given all of this, it stands to reason that there will be observable gender differences in priority setting when it comes to group–based climate change adaptation strategies. Men's and women's priorities for adaptation will be shaped by the existing norms, roles, and responsibilities and how adaptation strategies build on, ameliorate, or distort these. An extensive body of evidence from around the world indicates that culturally specific gender norms define the roles that men and women play in farm and natural resource management. Though these will vary across culture and context, Meinzen–Dick et al. (2010) identify a number of trends observable on a larger scale. In terms of roles, women often have greater responsibility for family food production, processing, and food preparation for the household, whereas men have greater involvement in market–oriented production. In addition, evidence indications that norms related to dissemination and distribution of foodstuff, nutrient and calories often have gender dimensions. Even in normal conditions, women often eat last and consume fewer calories and few nutrients; in crisis times, as a coping strategy, they may resort to skipping meals or eating non–traditional foods, which may have implications for their ability to adapt to climate shocks (Patt, Dazé, and Suarez 2009) or longer–term health consequences. For example, women in Bangladesh are more calorie–deficient than men and consequently cannot recover as well from the negative effects of flooding on health (Cannon 2002). Thus, women may prioritize CBA strategies that promote long term food and nutrition security within the community, such as community level projects, trainings, and facilities focused on food storage and preservation or development of community gardens with micronutrient–rich food.

Throughout the world, women typically perform the time–consuming task of collecting water, fuel, and fodder for domestic consumption (White, Bradley, and White 1972; Karlsson 2008). These already arduous tasks may become more difficult in light of climate changes, which may force women to go further under tougher conditions to find water and fuel. Community–level investments in domestic water supplies, such as rainwater collection or other types of community water storage, may be a priority for women. Such investments would have the dual benefit of lightening women's workload and reducing their exposure to water borne diseases such as cholera and dysentery (Denton 2004). In Morocco, UNDP–GEF found local women had valuable input about a well building program given that they were responsible for fetching water (UNDP 2010). However, UNDP–GEF realized that women needed to be supported in sharing their opinions with the community otherwise their voices and perspectives would be overlooked in the highly gender– and class–stratified society. Related to this, women may also prioritize community–level investments in access to alternative energy sources, particularly clean energy sources (such as biomass, biogas, solar power, improved stoves and battery operated lamps). In addition to reducing women's workload, clean energy sources can reduce the many health risks affiliated with cooking over an open fire (Denton 2004; Terry 2009; UNDP 2010).

Throughout much of the world, responsibilities for child care and care for the sick and elderly remain primarily a female task. Women, thus, may prefer CBA

strategies that do not require mobility and allow them to stay close to the homestead to attend to these duties. In some contexts, social norms related to female mobility may further shape women's preferences for CBA strategies. For example in Bangladesh, where strong norms of seclusion severely limit female movement and access to information, Patt et al. (2009) find that women were not comfortable living in mixed–sex recovery shelters and chose to remain in homesteads in spite of the elevated risk level. Further evidence from Bangladesh indicates women's lack of mobility may be a principal reason why they are less likely to survive cyclone–induced floods (Ikeda 1995; Cannon 2002). CBA strategies which take into account these context specific norms are likely to be more successful and adopted by a wider range of community members. In a CARE evaluation in Bangladesh, Patt, Dazé, and Suarez (2009) find the adaptation strategies taken most by women were those that could be adopted in the homestead, such as duck rearing. Hallman, Lewis, and Begum (2007) and Quisumbing and Kumar (2011) evaluate the uptake of group vegetable and fishpond interventions in Bangladesh and find women have more success with vegetable gardens that could take place at the homestead and did not require excessive mobility. All of this being said, roles and norms will change depending on country and context, and CBA strategies will need to be appropriately adjusted. Likewise, adaptation strategies may bring important trade–offs for rural women and men. For example, a climate intervention in Kenya increased the workload of women but also gave them greater control of income (Eriksen and Lind 2009).

Evidence indicates that men and women may actually perceive climate risks differently; a fact that may further feed into the development of gender–differentiated priorities for CBA. In a study of small farmers in South Africa, Thomas et al. (2007) found gendered livelihood patterns impacted climate risk perception; men in the study community, charged with livestock rearing, were primarily concerned with drought, and women in the community, charged with agriculture, primarily concerned with heavy rains. In addition to perceiving different risks as important, the same risk may have different meanings for men and women (Gustafson 1998). Furthermore, evidence indicates that men and women may have fundamentally differential risk taking behaviors. In a meta–analysis of 150 studies over a period of 50 years Byrnes and colleagues (1999) find men tend to be more risk–taking than women which is attributed, in part, to over confidence and enjoyment of challenges. Women's more "risk adverse" behavior may afford them certain benefits when it comes to climate change adaptation. In a field experiment on risk taking in Zimbabwe, Patt, Dazé, and Suarez (2009) find women are more likely to seek advice, listen to advice, and learn from experience than their male counterparts. In addition, women in the study considered social context and social cues to a greater extent than men. All of this may relate to men's and women's relative propensity to adopt ex–post group based adaptation strategies, such as weather insurance, that require foresight and risk aversion.

7. CONCLUSION

Given the exclusion of certain groups from the decisionmaking process, CBA may not adequately reflect the priorities and needs of all members of the community. As a result, CBA strategies may end up benefiting the "less vulnerable" in the

community (Adger et al. 2006). For example, in rural Bangladesh, Amin, Rai, and Topa (2003) find that the Grameen Bank's group–based community activities are successful in reaching the poor; however they are less successful in reaching the vulnerable, and unsuccessful in reaching the vulnerable poor. It may be that less vulnerable individuals join, and are able to join, groups. In rural Bangladesh, Quisumbing (2009) finds women who are less vulnerable, meaning they bring more assets to marriage, live closer to their natal villages, have sons, and are more likely to belong to a group. Arguably, CBA that benefits the "less vulnerable" may actually increase the vulnerability of some community members by denying them access to valuable community resources or opportunities or by reallocating existing community–level resources. Related to this, literature on rural development projects from across a variety of contexts indicate that women's livelihood activities and/or assets may be appropriated by men as they increase in value due to development interventions (Meinzen–Dick et al. 2010). Even if CBA strategies are successful at improving women's assets or livelihood strategies there is a risk of appropriation by members of the community with more power or influence.

Despite the challenges discussed above, the collective action literature provides strategies that may be useful to promote broader levels of participation and incorporate vulnerable community members into CBA activities. Reducing barriers to entry and participation for vulnerable groups is an important first step. For example, less wealthy members may prefer to contribute small amounts during each meeting rather than pay lump–sum fees. Pandolfelli, Meinzen–Dick, and Dohrn (2008) identify a number of other strategies to this end including allowing non–household heads and non–landowners to be group members; timing meetings to accommodate the workload of women and other vulnerable community members; ensuring that poorer women or vulnerable community members have opportunities to voice their concerns in group meetings; and soliciting the feedback of women and other vulnerable groups in project monitoring and evaluation. In Bangladesh, microfinance programs targeted to poor women have developed innovative means to address context–specific constraints. For example, group liability acts as a substitute for personally owned assets that can be used as collateral (Quisumbing and Pandolfelli 2010). Alternative methods of information dissemination, such as using innovative information communications technologies (ICT), can also be used to reach poorer sections of the population who tend to have lower literacy rates or who may be limited in mobility due to cultural norms of seclusion. For example, radio broadcasts have been used transmit educational content to rural women (Maskow 2000).

Many existing group–based asset and cash transfer programs operated by governments and civil society organizations also have a history of directly targeting female beneficiaries largely because of the evidence base on the different ways in which men and women allocate resources within the household. Examples of such programs include Progresa in Mexico, BRAC in Bangladesh, and Helen Keller International in South Asia and Burkina Faso. Government policy may also have a role to play in ensuring vulnerable sub–populations are adequately represented in local governance or community organizations working on CBA. For example, in Rwanda and Tanzania, legislation mandates that local land committees throughout the country and local government management committees be composed of at least 30 percent women, which has increased the voices and visibility of rural

women throughout land reform projects in the country (Daley et al. 2010; Walker 2002). Furthermore, research from India has shown that women in leadership positions are more likely to make policy decisions that directly address the needs of women in the community (Chattopadhyay and Duflo 2004).

Vulnerable community members are also more likely to participate when projects directly incorporate their concerns and priorities. For example, in the Philippines, attempts to have women monitor lake water to determine if soil conservation techniques were reducing silting were unsuccessful until project staff realized that women were more interested in health issues than in soil loss. When the project began to raise awareness about how water quality affected the health of families and the program expanded to include monitoring for E. coli, women's participation significantly increased (Diamond et al. 1997). In addition, CBA may be more successful at integrating a wide range of actors when it builds upon or takes advantage of existing indigenous strategies for adaptation which are often the domain of women or other marginalized community members, such as soil preservation and management techniques, biodiversity and foraging for wild medicinal plants for food, medicine and fuel (Denton 2002; Rossi and Lambrou 2008). For example, Chowdury (2001) shows how women's indigenous knowledge of the charlands in Bangladesh would be useful to incorporate into adaptation strategies; however this knowledge has largely been ignored in development projects.

If the needs of a wider range of community members are taken into account, CBA may be leveraged to the benefit of vulnerable community members. For example, investments in improving community natural resources (such as the construction of terraces, irrigation, water catchment areas, drainage, and regular composting) can be particularly labor intensive and may be too expensive to undertake in households with limited access to labor. This has negative implications for female–managed plots or female–headed households, which tend to have more difficulty accessing labor (Peterman, Behrman, and Quisumbing 2010). CBA provides an opportunity for women or other vulnerable community members to gain access to these necessary resources via community level action.

APPENDIX 1: ADAPTATION TYPOLOGIES

Table 1: Community–based adaptation strategies according to their type/function

Form/Type	Function	Examples
Mobility	Pools or avoids risks across space	Migration or relocation of animals Wage–labor migration
Storage	Pools or reduces risks over time	Water storage Food storage (crops, seeds, products) Asset accumulation (livestock)
Diversification	Reduces risks across assets/livelihood sources	Asset diversification Livelihood diversification Skills and occupational training
Communal pooling	Pools risks across households	Infrastructure development Information gathering and dissemination Disaster risk management
Exchange	Reduces risk through access to markets	Group–based weather insurance Group–based credit facilities Improved market access Input purchases

Source: Agrawal and Perrin (2008)

Table 2: Community–based adaptation strategies according to their timing

Ex–ante	Risk prevention strategies (reduction of exposure or sensitivity)	Investments to protect and enhance community assets Investments in physical and social infrastructure Investments in human capital (education, literacy, training) Building social capital Rights and security
	Risk mitigation strategies (or compensation)	Group–based insurance schemes Group credit or saving mechanisms Collective storage facilities (e.g. food, seed) Collective livelihood diversification schemes (e.g. income–generating activities) Local weather monitoring, information gathering and sharing
Ex–post	Ex–post coping strategies	Depleting community assets Receiving external aid (e.g. food aid, emergency relief) Migration of animals

Source: Heltberg Siegel, and Jorgensen (2009)

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