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Analysis

How Do Capital Asset Interactions Affect Livelihood Sensitivity to Climatic Stresses? Insights From the Northeastern Floodplains of Bangladesh

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ABSTRACT

This paper offers a novel methodological approach for better understanding how different capital assets can be organized, transformed, and used in different combinations to reduce livelihood sensitivity to climatic stresses – an area that requires greater research attention in the context of adaptation policy. Research was conducted in the northeastern floodplain communities of Bangladesh, regarded as one of the most climate sensitive, resource poor, and highly understudied areas of the country. This wetland-dominated ecosystem is home to diverse resources user groups (e.g., farmer and fisher) who are subjected to regular seasonal flooding, excessive rainfall, drought, and flash floods. Working in 12 adjacent villages of two significant wetlands (Hakaluki *haor* and Tanguar *haor*), qualitative and quantitative data were collected through 15 focus groups ($n = 15$), 35 key informant interviews, and 356 household surveys to better understand how community members adapt in response to their livelihood sensitivity to the climatic stresses. Results indicate that community members organize and transform capital assets in diverse ways to escape climate-induced "poverty traps". Findings also reveal that interventions from external agencies (e.g., government, non-governmental organizations and market institutions) are an important key to livelihood sustainability for many households.

1. Introduction

Sensitivity, a component of climate vulnerability, indicates the degree to which a system is either positively or negatively affected by climatic stresses (IPCC, 2012). In other words, it is the measurement or exploratory description of a system's stability under stress. However, since sensitivity depends on context-specific system properties and their responses to stresses, there is no 'rule of thumb' for describing it in different contexts (Ford et al., 2010). For example, rural smallholders in developing countries are considered to be among the most climate-sensitive livelihood groups since they depend on social-ecological systems for their living (Bele et al., 2013; Ford et al., 2014). While the livelihood activities of, and opportunities for, rural smallholders are governed by the availability and productivity of ecosystem resources and socio-economic processes (Bele et al., 2013; Etzold et al., 2014), climatic uncertainties directly impact the ecosystem and influence livelihood sustainability (Bunce et al., 2010; Eitzinger et al., 2014).

According to the sustainable rural livelihoods (SRL) framework, livelihood resources, which are derived from social-ecological systems, are grouped into five capital asset categories: financial, manufactured, human, social, and natural capital (Ellis, 2000; Reed et al., 2006; Birkmann et al., 2013; Speranza et al., 2014). These asset categories are widely used as the basis for sensitivity-measuring indicators (Binder et al., 2013; Marshall, 2011) that operate on the underlying assumption that the degree of access to assets directly influences a household's sensitivity to various stresses (Barua et al., 2014). However, the selection of indicators is highly contextual (Birkmann, 2006; Polsky et al., 2007; Füssel, 2010). For example, three very different sets of indicators were used to conduct assessments of the sensitivity of river basin management in Taiwan, marine-fisheries-based livelihoods in Bangladesh, and water resource systems in the eastern Nile basin (Hamouda et al., 2009; Hung and Chen, 2013; Islam et al., 2014). Notably, the selection of indicator sets is often guided by indicator selection principles and is grounded either in the existing literature or derived from field studies (Adger et al., 2004; Birkmann, 2006).

Despite the theoretical rigor and methodological robustness of indicator-based analysis, some researchers remain skeptical about its usefulness. For example, Below et al. (2012) noted that indicator

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approaches provide normative arguments (e.g., which conditions are good and which are bad) but cannot offer context-specific conclusions when applied to assess a poorly-defined system. Moreover, O'Brien et al. (2007) suggested that context-specific sensitivity is an assimilation of political, institutional, social, and economic structures, many of which are external to the context. These findings are extended by Hinkel (2011) who identified this feature as a major challenge to defining the boundary of a system. In addition to these observations, we also note that the indicator-based approach often fails to reflect the theoretical background of individual (or groups of) indicators. For example, according to the SRL framework, capital assets are connected to each other in different ways (Fang et al., 2014). Notably, each of these assets has its own observed variables, and variables of one asset may interact with those of another. In this paper, we assume that livelihood sensitivity is governed by these overlapping interactions, but that it cannot be adequately captured by their independent assessment.

This paper goes beyond widely used indicator-based measurements and offers a methodological approach that aims to address three key livelihood sensitivity-related questions: i) To what extent are capital assets connected to each other? ii) What is the nature of their interconnectivity? and iii) How do the interactive associations of capital assets contribute to reducing climate sensitivity? Thus, this study contributes to filling a research gap that limits our understanding of how resources can be better invested to reduce livelihood sensitivity to climate change (Ribot, 2014).

2. Conceptual Background

2.1. Characterizing Capital Assets

Rural development literature suggests that capital assets enhance the ability of smallholders to sustain their livelihoods, while climate adaptation studies identify them as buffers against risk and uncertainty (Devereux, 2001; Cinner et al., 2013; Speranza et al., 2014). However, the characterization of capital assets in relation to climate sensitivity is dynamic and complex. Although overlooked in much of the adaptation literature, development economics and resilience theories provide two necessary concepts that can assist with better describing these relations: poverty and rigidity traps.

Development economics describes a poverty trap as self-reinforcing, persistent poverty that occurs because of three conditions (Maru et al., 2012). The first condition is the *threshold effect*, which suggests that poverty persists because one or more capital assets remain under a critical level, consequently slowing development growth. The second condition, *institutional dysfunction*, may arise due to socially-embedded power asymmetries, the political exclusion of marginalized sects of society, and economic inequality. The third condition, *neighborhood effect*, results from socio-economic inequalities that separate society into several sub-groups based on economic status. This condition describes a socio-economic situation wherein affluent groups are able to afford better opportunities, whereas less affluent groups cannot; the result is that poorer groups tend to inherit their economic status, which is passed down from generation to generation.

As described in Holling (2001) and Moore and Westley (2011), resilience theory suggests that a community becomes stuck in a poverty trap as a consequence of poor potential (i.e., assets), poor connectivity (i.e., network and institutional connectivity), and poor resilience (i.e., the capacity to consume external shocks like climatic stresses). For example, Maru et al. (2012) and Crona and Bodin (2010) suggest that indigenous communities often fall into poverty traps because of economic and social inequity resulting from insufficient and unorganized capital assets, and that this situation of limited resources leads to unfocused and myopic innovations.

Although discussed primarily in resilience theory, a rigidity trap is considered a consequence of high levels of potential, over connectivity among institutional actors, and high resilience (Carpenter and Brock, 2008). When a system falls into a rigidity trap, an innovation vacuum is created, which can lead to lower diversity and change within the community (Allison and Hobbs, 2004; Carpenter and Brock, 2008; Holling, 2001). For example, Amekawa (2011) argued that households with higher levels of capital asset endowment for agricultural activities tend to show poor innovation when it comes to generating non-agricultural livelihood activities. Despite this, Maru et al. (2012) concluded that, between the poles of the poverty and rigidity trap, there is an optimal range of potential, connectivity, and resilience that supports the development of innovation, self-organization, and flexibility to reduce sensitivity. However, while the identification of this range is critical, it is often very difficult. For example, it is unclear what level of assets constitutes the threshold of this range, which assets can be categorized as having “low” or “high” potential, or what level of connectivity indicates functioning institutions.

Both development economics and resilience concepts consider such traps from different perspectives, yet together they propose that homogeneity in asset ownership across a community (a development economics perspective) and functional connectivity among them (a resilience perspective) are necessary for escaping traps and generating and sustaining multiple livelihood activities (Moore and Westley, 2011; Maru et al., 2012). Both concepts also emphasize the capital assets required to sustain a livelihood through generating necessary feedbacks when stresses occur (Haider et al., 2018). Here, the SRL framework focuses on three potential relationships among assets. First, assets may be sequentially related, which means that one capital asset ensures the availability of others and vice versa. For example, Barua et al. (2014) noted that the loss of human capital increases the susceptibility of natural capital loss, while households with higher levels of financial capital can bear the cost of innovation by experimenting with new technologies and learning new skills (van den Berg, 2010). Second, one asset may be substitutable for another. For example, Tacoli (2009) and Etzold et al. (2014) point out that, in the absence of sufficient natural capital, the climate-stressed rural poor in Bangladesh adopt migration—which requires a high degree of social capital—as a livelihood strategy. Third, a combination or cluster of different assets sustains livelihood activities. For example, Deressa et al. (2009) noted how Ethiopian farmers depend on all five capital assets in order to adapt, while Dorward et al. (2009) concluded that capital assets are used in specific combinations for generating different livelihood strategies.

2.2. Capital Assets and Livelihood Diversities

Chambers (1989) and Amekawa (2011) have suggested that rural smallholders do not invest all their assets in a single livelihood practice; rather, they distribute them among multiple activities to reduce the risk of investment failure. Therefore, rural communities construct a portfolio of practices, which Cinner and Bodin (2010) define as a livelihood landscape. Livelihood opportunities are dependent on a household's ‘bundle of rights’ in relation to the assets (Ribot and Peluso, 2003), although access rights are often challenged by the poverty that results from social exclusion, skewed market access, powerlessness, and exclusion from policy processes (Goulden et al., 2013; Ribot, 2014). Thus, it has been argued that the impact of climatic uncertainties is compounded by socio-political and socio-economic entities, which in turn creates a group of people who are highly sensitive to climatic stresses (Kelly and Adger, 2000; Scoones, 2009). As a result, the exclusion of socio-political and socio-economic entities from the description of climate sensitivity is conceptually difficult.

2.3. Measuring Livelihood Sensitivity

Although an explicit connection exists between climatic and non-climatic entities (McDowell and Hess, 2012), Cinner et al. (2012) were able to offer a livelihood sensitivity measurement technique that is solely based on natural resources dependency. This technique is based