



Developing a holistic approach to the analysis of farmer decision-making: Implications for adaptation policy and practice in developing countries



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ABSTRACT

Smallholder farmers operate within a risky and uncertain context. In addition to climate variability and climate change, social, environmental, institutional, and market-related dynamics affect their agricultural decisions and ability to cope and adapt. In this paper, we develop and apply a set of framing questions to investigate the factors shaping farmer decision-making and how these are situated in pathways of response. Drawing on a literature review of decision-making for risk management, five questions are posed to frame enquiry: what livelihood decisions are undertaken by households, who makes what decisions, when do households make decisions and why do they make them, and how do decision making processes evolve and response pathways arise. This approach conceptualises and explores household decision-making in a holistic manner, moving beyond previous studies that examine smallholder decisions through disciplinary boundaries (e.g. psychology, economics, risk management) or particular theoretical approaches (e.g. bounded rationality, theory of planned behaviour). The framing questions together with key insights from literature are used to design and interpret empirical evidence from Pratapgarh, a tribal-dominated rainfed district in southeast Rajasthan, India. The findings suggest that while resource ownership and access are the main drivers of decision-making, socio-cognitive factors such as perceived adaptive capacity and perceived efficacy to carry out adaptive actions are equally important factors mediating farmer responses. We also find that the holistic approach helps explain how personal motivations and individual perceptions of adaptive capacity interact with socioeconomic, climatic, and agro-ecological dynamics at local and regional scales to mediate risk perception and inform response behaviour. A typology of response pathways demonstrates how different households' trajectories are determined. Making a case for mixed methods to investigate farmer decision-making holistically, this paper provides an approach that reflects the complex and iterative nature of real farmer decision-making and can be used by researchers, policymakers, and practitioners to better understand and describe decision making and to develop informed policies and interventions.

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1. Introduction

Agricultural decisions, especially in rainfed contexts, are made in response to multi-scale and interlinked stressors on agriculture, rural livelihoods, and natural resources. There are many studies

exploring smallholder decision-making, for example, within the areas of technology adoption, economics, and behaviour (Ajzen et al., 2002; Marfo et al., 2008; Spielman et al., 2009). While such studies have made major contributions to understanding smallholder decision-making, each discipline-focused approach on its own is limited by not including the concepts and insights from others. To help identify entry points for facilitating behavioural change for adaptation policy and practice, a more nuanced understanding of farmer decision-making is important. There is therefore a need for examples of ways to explore decision-making that allow more holistic enquiry and understanding.

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In the context of climate change adaptation (CCA), there has been relatively less emphasis on acknowledging and exploring cognitive, normative, and institutional barriers to adaptation (Grothmann and Patt, 2005; O'Brien, 2009; Frank et al., 2011; Jones and Boyd, 2011; Gifford, 2011; Grothmann et al., 2013; Shackleton et al., 2015). For example, in Western Nepal, Jones and Boyd (2011) find that social norms, which dictate livelihoods based on caste, intersect with gender and age to shape adaptation response. In Western India, Jain et al. (2015) show risk aversion or beliefs about changes in monsoon onset to be associated with increased adaptation.

This paper has two main objectives: to integrate existing understandings of decision-making in a holistic approach that better describes the range and processes of farmer responses to climatic and non-climatic risks; and to investigate and describe smallholder decision-making in Pratapgarh, India, a district with a predominantly tribal population dependent on rainfed agriculture. The paper reviews relevant literature before providing a set of framing questions to guide investigation of smallholder decision-making. These, together with key insights from the literature, are used to design and interpret a study (involving the use of empirical evidence from a household survey and in-depth life histories) in Pratapgarh. The paper therefore seeks to provide improved understanding of decision-making processes in Pratapgarh, new insights into decision-making and adaptation, and to contribute to ways in which decision-making can be explored in rainfed environments in developing countries.

2. Conceptualising household-level agricultural decision-making

While studies have demonstrated that perceptions of exposure to climate change shape and motivate response decisions (Maddison, 2007; Slegers, 2008), the process of response decision-making and adaptive behaviour is still poorly understood (Gbetibouo, 2009; Williams et al., 2013). Traditional approaches to understanding farmer decision-making and behaviour have been constrained by disciplinary lenses such as economics (the 'homo economicus' (Wolf, 1990:65) was a rational, profit-maximising individual who acts to maximise utility), anthropology (agricultural choices seen as fluid and responsive to the decision-making environment) (Barlett, 1980), psychology (Armitage and Connor, 2001; Ajzen et al., 2002; Gifford, 2011), and more recently, cross-disciplinary approaches such as CCA research (Maddison, 2007; Frank et al., 2011; Williams et al., 2013; Jain et al., 2015). Farmer choices have also been explored through particular (1) theories (e.g. theory of planned behaviour, bounded rationality), (2) viewpoints such as innovation and adoption studies (Marfo et al., 2008), or (3) farming systems research (Dorward et al., 1997). Even studies on decision-making around CCA tend to focus on one or few aspects of decision-making such as temporal dimensions of risk management (Jain et al., 2015) or how social identities drive adaptation choices (Lambrou and Nelson, 2010). There is an opportunity to consider more holistic approaches to conceptualising household-level agricultural decision-making.

Inherent to the process of household-level decision-making is the understanding that farmers perceive changes in climate and non-climatic risks and then identify possible responses (Maddison, 2007). However, the relationship between perceptions and resulting behaviour is not simple, direct, or linear (Slegers, 2008). From intention to actual response, decisions are made within the context of socio-cultural norms and beliefs (Armitage and Connor, 2001; Jones and Boyd, 2011) and operate within a larger system of religious ties and common heritage. Thus, household livelihood

decisions and adaptation behaviour are embedded in local and larger socio-ecological contexts.

Behavioural changes such as those involved in adaptation (and in a shorter time frame, coping), require individuals and communities to make decisions from a range of available choices. While these decisions are shaped by asset availability, time required, monetary cost (Kahan, 2008); and perceptions of risk, familiarity, and experience (Adger et al., 2009), they must also be accompanied by an intention to act (Ajzen et al., 2002). All these factors are also mediated by personal beliefs (Armitage and Connor, 2001), social identity (Frank et al., 2011), and normative beliefs held by influential people such as parents, spouse, leaders, and religious heads (Reser and Swim, 2011; Martínez-García et al., 2013). Additionally, 'perceived adaptive capacity' (Grothmann and Pratt, 2005:202) or the decision-maker's perception about his/her 'competence' to carry out adaptive action (Kroemker and Mosler, 2002:200) shapes behaviour. Household responses to climatic and non-climatic stresses are chosen by a subjective assessment of risks and vulnerability. These responses are conceptualised as falling along a response continuum (Fig. 1): from maintaining status quo (no response) to coping (short-term response, which may lead to adaptations or exacerbate vulnerability), and finally, adaptation, which implies a more permanent change with a learning component. This 'response continuum' moves beyond the simplistic dichotomy of coping and adaptive capacity similar to 'capacity to respond' (Spence et al., 2011) or 'response space' (Osbaahr et al., 2011).

On the extreme left of Fig. 1, households are driven by short-term gains and undertake coping strategies. Such households may either 'adapt' negatively, leading to maladaptation and erosion of system resilience (Jones et al., 2010) or manage crisis-like conditions by meeting immediate needs (Adams et al., 1998). Towards the centre, households maintain status quo by protecting their natural and social assets from severe erosion (Rademacher-schulz et al., 2014). Towards the right, households cope positively and undertake longer-term adaptive responses. Livelihood portfolios are adjusted to reduce current and potential vulnerability by taking into account *trends* of climatic and non-climatic stressors (Williams et al., 2013; Rademacher-schulz et al., 2014) as well as dynamics in the local and wider socio-ecological landscape. Such 'successful adaptors' proactively avoid high-risk challenges that result in potentially negative changes and take advantage of developing opportunities (Park et al., 2012). On the far right, the rainfed agricultural system (of which a rural household is a part) is conceptualised to undergo transformation, signifying a change in the 'state of the system' (Walker et al., 2004).

While the response continuum concept provides a framework on which to place farmer livelihood strategies and understand decision-making, actual farmer strategies are more a basket of coping, maladaptive, and adaptive strategies rather than a binary where household members choose one strategy type. Therefore, multiple decisions may be made by different household members which interact to make households take different pathways (Fig. 2): they may spiral downwards from transitory to chronic poverty, get locked into cycles of deprivation, or make incremental adaptations through successful coping.

Real-time dynamic decision-making is usually a 'plurality of sub-decisions' (Mintzberg et al., 1976:252) without any definite, linear sequence and is more closely a 'continuous flow of behaviour toward some set of goals rather than as a set of discrete episodes involving choice dilemmas' (Brehmer, 1990:26). Thus, we conceptualise decision-making as a process where although distinct phases can be delineated, they have several feedback loops and iterations of adjustment.

Decisions to adapt are taken at various scales: by individuals in response to climatic events and socio-economic dynamics,

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