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## Adaptation trajectories and challenges in the Western Ghats: A case study of Attappady, south India



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### ABSTRACT

Climate change adaptation has become an important aspect of research and policy agendas at different scales – globally, nationally and locally. One stream of thought relates to the thematic area of barriers or challenges that adaptation faces. This article explores local adaptation trajectories and challenges in a tribal development block in south India. Through the lens of key livelihood strategies pursued in the block – namely income from development interventions, migration and on-farm strategies – it explores the challenges and factors that contribute or have contributed, to impeding successful adaptation outcomes in Attappady. The article argues that development interventions (i.e. planned adaptations) have not succeeded in addressing structural causes of vulnerability; they have, however, provided an important coping mechanism. Migration is a socially and culturally differentiated phenomenon and is not a viable diversification option for the most vulnerable population segments in Attappady. Finally, it is found that recent on-farm adaptation strategies present a case of maladaptation that promote marginalisation and are ill-suited to the local ecological and cultural landscape.

### 1. Introduction

Adaptation to environmental change is a time-tested phenomenon, characteristic of collective and individual action in human societies. Adaptations can take various forms, such as developing seed varieties, constructing water storage facilities, forming risk management institutions, and facilitating behavioural change. The purposes of adaptation processes and actions include the reduction of risk and uncertainties stemming from events precipitated by environmental change and related hazard events, including those from climatic variability and change. Ultimately, they aim to secure the prosperity and wellbeing of communities in a given spatial context. Successes and failures of adaptation have been documented historically, as with the demise of the Norse population in Greenland for instance, or the collapse of civilisations due to prolonged drought periods (Diamond, 2005; deMenocal, 2001).

In the context of anthropogenically induced climatic changes and related public and policy debates, adaptation studies have gained widespread visibility and added vigour. Governance debates and research agendas revolve around understanding, providing and creating effective levers and mechanisms to foster adaptive capacities and action at different tempo-spatial scales. These deliberations range from the global to the local, involving multiple actors and science perspectives.

One line of inquiry concerns the reaching of tipping points or

thresholds beyond which adaptations become impossible or are no longer feasible (Lenton et al., 2008). Shifts and alterations in biophysical systems can lead, in extreme cases, to species extinction and render adaptations futile. The Intergovernmental Panel on Climate Change (Adger et al., 2007) sees such limits as being firmly rooted in ecological and physical attributes of a system. Barriers to adaptation can, on the other hand, be surmountable, even in the face of stress on system attributes. Adger et al. (2007:733) define these barriers as ‘the conditions or factors that render adaptation difficult as a response to climate change’. Technological and economic developments can enhance, stretch or overcome certain barriers but also have recognisable limitations (Agrawala and Fankhauser, 2008; Parmesan and Yohe, 2003). Beyond clearly defined ecological and physical limits and their technological and economic components, socially rooted limits and barriers pose quite different questions and are more ‘fuzzy’. Attributes of social and cultural systems located in institutions, power relations, knowledge, values and belief systems influence the ability to adapt and are recognised in an emergent literature (Naess et al., 2005; Robledo et al., 2004; Adger et al., 2009; Dow et al., 2013). Rather than referring only to barriers, this article views social and cultural aspects as challenges that can impede sustainable adaptation outcomes.

India is one of the most climate-vulnerable countries in the world. Its biophysical systems are highly sensitive to added climatic exposure and its population remains largely dependent on climate-sensitive

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sectors of the economy, with limited capacities to adapt in the face of widespread poverty, marginalisation, social exclusion and poor institutional capacity (Maplecroft, 2014; Hijioka et al., 2014; Dreze and Sen, 2013). Geographically, the Western Ghats mountain range along India's south-western flank is classified as highly vulnerable to climatic changes (Nandakumar, 2014). Attappady is located in this region and forms an administrative division in the south Indian state of Kerala. It has experienced widespread environmental change and is home to a sizeable indigenous population. In response to severe environmental and social stress experienced during the past decades, various livelihood strategies have been adopted and promoted in Attappady. Three key livelihood strategies, namely income from development interventions, migration and on-farm strategies, provide the starting point from which this article seeks to examine key trajectories and challenges to adaptation.

The article distinguishes between autonomous and planned adaptation. It argues that state-led development interventions (i.e. planned adaptation) provide an important coping mechanism but have not significantly contributed to the promotion of enduring adaptation trajectories; that migration is a culturally and socially differentiated phenomenon which is not readily available as an outlet to some population segments; and that the sustainability of adaptation towards market-driven, perennial cash crop (plantation) agriculture is questionable.

## 2. Adaptation, livelihoods and socio-cultural processes

The socio-economic impacts of climatic change are varied and documented to lead to livelihood disruption, occupational and income loss, reduced wellbeing or premature death – effects that are unequally distributed across societal sections (IPCC, 2014; Ribot, 2010). Rural dwellers in developing countries in particular, experience additional pressures in their day-to-day life (Francis, 2000). Adaptation to environmental change is a complex process, embedded in a fluid climate–society relationship that remains subject to a continuing debate on meaning and interpretation. Taylor (2015), for instance, questions the premise of an artificial climate–society dichotomy that treats the climate as a separate, governable entity and yet informs much of the climate change adaptation debate. Adaptation responses are, therefore, closely linked to the way in which the problem is diagnosed and framed, that is, what generates vulnerability to climate change? The IPCC (2014:5) proposes a definition of climate change adaptation as: ‘a process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities’. This article goes beyond seeing adaptation merely as a response to climate stimuli in a separated human–environment system; adaptation is understood to be part of an existing vulnerability context premediated by historically conditioned and scaled, socio-economic, cultural and ecological factors. It also responds to Ribot's critique of ‘locating causality within the hazard’ (2014:667), and the undue focus in the risk-hazard literature on proximate causes for vulnerability, which sidestep interacting socio-ecological processes that leave people vulnerable in the first place. Environmental change is but one stressor that dynamically interacts with social systems and potentially amplifies or re-configures existing vulnerability patterns – as Ribot (2010:1) pointedly states ‘vulnerability does not fall from the sky’. In a natural science framing however, adaptation to climate change is more concerned with homogeneous, quantifiable limits, costs and benefits, and responses concentrating on techno-managerial solutions (O'Brien and Barnett, 2013). Barriers and limitations to adaptation are accordingly defined and located. A contextual framing provides for qualitative analysis of these and acknowledges the importance of existing social and cultural processes in understanding and framing adaptation responses (O'Brien et al., 2007). Taylor (2013), drawing on research in south India, illustrates how vulnerability is a relational and socially embedded phenomenon that requires in-depth analytical insights and practical engagement with issues of power, in the absence of

which, oppressive and unequal socio-economic structures (i.e. caste system) risk continuous reproduction. A growing body of critical studies also highlights how existing adaptation projects might assist people, but at the risk of obscuring fundamental questions of politics and power (Eriksen et al., 2015; Brown, 2014). Landlessness, patriarchal gender relations, caste system hierarchies or lack of rights, leave people disempowered and impede the ability to respond to or recover from rapid environmental changes and events. Without due attention to socio-political dynamics and ingrained power relations that lie at the root of vulnerability, transformative changes are unlikely to be achieved (Ribot, 2014).

Adaptation can be planned, i.e. be a deliberate policy effort borne out of awareness that changes have taken place and require concerted action to redress (e.g. construction of sea walls, social protection); or adaptation can be autonomous in that it takes place regardless of broader plans and policy (Huq and Klein, 2013). The latter is largely driven by decisions at individual or household level to reduce risks and can refer to behaviour change, for example in agricultural practices or water management, but can also include opportunity induced responses to market signals. A distinction is also frequently drawn between coping and adaptation. Coping is a process that can involve days, months or a few years; adaptation can involve longer timescales (Smithers and Smit, 1997). For example, changing agricultural systems in response to climatic changes can take decades, while responses to individual climatic events can involve shorter periods. At the same time, coping processes are facilitated by adaptation. By strengthening coping abilities, requirements for adaptation can potentially be reduced (Eriksen et al., 2005).

The literature concerning livelihoods identifies different strategies adopted by households to cope with or adapt to livelihood stresses, and is widely used in social vulnerability analysis (Adger and Kelly, 1999). A livelihood ‘comprises the capabilities, assets (including both material and social resources) and activities required for a means of living’ (Scoones, 1998:5). Pursued strategies can relate to agricultural extension or intensification, livelihood diversification and migration. For instance, severe and persistent drought can prompt family members or households to relocate to other areas in search of alternate livelihood options. Livelihoods research has played an important role in examining how and why different actors and institutions have responded in varied ways to foster livelihood security – or why they have not (Ellis, 2000; Elmqvist and Olsson, 2007).

Social and cultural processes have found increasing recognition in development research with respect to governing, mediating and augmenting the access to livelihood capitals and influencing livelihood outcomes and strategies (Daskon, and McGregor, 2012; de Haan and Zoomers, 2005). They also play an important, yet often underplayed, role in climate change adaptation. Culture is composed of the totality of art, symbols, language, rituals that are intermeshed to create a common, yet differentiated, identity, values, gives meaning to a place and flows into collective decision-making (Suchman, 1995). Climate change impacts can influence or obviate traditional livelihood practices, such as hunting in the Arctic (Seguin Furgal and Seguin, 2006). Cultural aspects also influence adaptation pathways by effecting socially differentiated decision-making (Adger et al., 2013). Nielsen and Reenberg (2010), in a study in Burkina Faso, elucidate that ‘cultural sensitivities’ can give rise to heterogeneous adaptation pathways, exhibited through non-linear actions by different community members and play a particularly important role when it comes to looking beyond a short-term coping ability.

The identification of the events and processes that harm valued objects at risk are diverse, context-dependent and socially and individually differentiated with response processes and mechanisms contingent on this prior identification. Capacities to respond are in turn anchored in institutions, structures, values and knowledge systems. Social and cultural aspects thus condition the ability to appropriately respond to climate impacts and prioritise certain actions and groups

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