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Evaluating participatory techniques for adaptation to climate change: Nepal case study

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ABSTRACT

The community-based climate change adaptation plan of action (CAPA) ensures a bottom-up planning process to minimize climate impacts on the livelihood of vulnerable people and provides adaptation actions for increasing resilience capacity in Nepal. This paper mainly examines the role of participatory tools and techniques with the potential to identify the level of vulnerability and likely adaptation measures to increase the forest resilience capacities of communities where CAPA has been prepared (i.e. CAPA group). In total, 13 participatory qualitative tools were evaluated against 15 criteria for identifying their performance in nine CAPA groups representing three geo-graphical regions of Nepal. Multivariate analyses of the participatory tools and their performance allowed for selecting the most similar and dissimilar CAPA groups. The results indicated how CAPA groups are evaluating the likelihood of climate change impact, determining the vulnerability of specific ecosystem services and understanding the possible local adaptation measures. Many methods do not offer conditions for exploiting new innovative opportunities, assessing scenarios or identifying ecosystem services in the CAPA process. Tools are required that consider qualitative and quantitative evaluation methods, measure vulnerability and ecosystem functions and services. Although many issues related to local conditions and vulnerabilities have not been tapped adequately, it is difficult to generalize individual case study results within the different geographical contexts of Nepal. The integration of adaptation planning in local institutions, in order to deal with different ecosystem-based adaptation options, along with identification of climate change scenarios, impacts, trade-offs, synergies and the sensitivity of management problems, is highly recommended.

1. Introduction

Formulating climate change adaptation plans has recently emerged as a popular development agenda to deal with the vulnerabilities and adverse impacts of climate change in human and natural systems. The formulation of a climate change adaptation plan is an important approach to address the negative impacts of climate change wherein identifying adaptation measures and prioritizing adaptation options are essential. Implementing adaptation practices for reducing vulnerability has become a high priority for policy makers and development organizations. An adaptation plan is typically required more for the current and short-term time scales of a vulnerability assessment and identifying adaptation strategies, and is more localized, such as at the household or community levels. Adaptation is necessary to deal with adverse climatic stresses and hazards and to uses opportunities such as innovations, which can be both to current, actual or projected conditions (Smit et al., 1999). Some of the critical factors limiting the adaptive capacity of developing countries to climate change include limited access to resources, lack of diversification options for subsistence livelihoods, and lack of health and education (Smit et al., 1999; Boon and Ahenkan, 2012). Adger et al. (2009) contends that limits to adaptation are endogenous to society and hence contingent on ethics, knowledge, attitudes to risk and culture. The assessment of vulnerability, exposure, sensitivity, barriers of adaptation measures and adaptive capacity are necessary to identify and implement subsequent actions. To develop alternatives for adaptation, a better understanding of the capacities of communities to adapt and the limits to adaptation are needed (Adger et al., 2009). However, communities and the resources on which their

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livelihoods depend are linked to larger intricate networks of ecosystems and the changing climate, including its uncertainty, makes adaptation at the local level challenging and difficult (Adger et al., 2009; Dessai and Hulme, 2004). The adaptation approach is being adapted for identifying crucial information regarding socio-economic vulnerabilities and opportunities, resource degradation, food scarcity and the provisions of basic services related to climate change at each local site (Gentle et al., 2014). The adaptation process is needed to understand the vulnerability of the system, the drivers of this vulnerability, and local adaptive capacities to address risk and resilience to the impacts of climate variability and change (Bollin and Hidajat, 2006; Füssel, 2007; Pelling, 2011). The term 'adaptation' in the context of climate change impact is now mostly considered to be synonymous with the 'capacity to cope with changes, reduce vulnerability, and improve livelihoods' (Agrawal, 2009; Orlove, 2009).

Climate change is a global concern with the perceived need to address climate-induced vulnerability through the process of adaptation planning. The climate sensitive social-ecological systems of the Nepali Himalaya are exposed to a high level of climate change and variability, which negatively affects the livelihoods of the region (Bhatta and Agarwal, 2015; Pandey and Bardsley, 2015). With the rise of climate change adaptation as a complex, multi-sectoral challenge that often overstrains policy-makers (in particular local ones), the demand for and the supply of various climate services increased (Clar and Steurer, 2018).

Countries like Nepal, where more than 80% of the population depends on agriculture and whose livelihood depends on agriculture land, and an extremely diverse landscape poses different levels of location and context- specific CC impact (GoN, 2011a, 2011b). Tiwari et al. (2014) argue that the situation is worsened by poverty, population pressures, land degradation, food insecurity, and deforestation. Recognizing climate change impacts and mitigation measures, the Government of Nepal (GoN) developed the National Adaptation Programmes of Action (NAPA), with local planning by proposing the Local Adaptation Plans of Action (LAPA). However, the LAPA framework has put the focus on local governments in terms of planning and implementation of adaptation activities and is silent on the role of community-level institutions (Paudel et al., 2013).

1.1. Social Innovation for local climate change adaptation planning

Social innovations act as drivers of social change (Cajaiba-Santana, 2014), making societies more sustainable and cohesive through inclusive practices, co-production and pro-active grassroots initiatives (Grimm et al., 2013). Understanding the role of the social, economic and political institutions, and learning from examples of social innovations linking ecosystem provisions to improve their wellbeing and resilience is important (Kluvánková et al., 2018). Communities that engage in the climate change adaptation plan of action (CAPA) initiative in Nepal are called CAPA groups, which consist of local institutions for social innovation, that support community engagement and self-organization. The local stakeholders are involved in sharing values, identify new actions and solutions to integrate the needs of the community and ecosystem based adaptation. The CAPA groups establish collaborative approaches with its members to create a shared vision, and formulate specific adaptation plans and actions to reduce climate change impacts as well as societal problems. In other words, CAPA members act as the change agents of society, following a bottom-up planning process, which engage local institutions and communities to improve the local adaptation system, by introducing new processes, approaches and solutions. CAPA groups prepare and implement a local adaptation plan focusing on forest management, biodiversity, and ecosystem related elements, including a vulnerability assessment, and other important social, economic and ecosystem aspects. CAPA groups provide new responses to reduce the impacts of climate change and improve human social conditions and quality of life. For this study, CAPA groups and their functionality were considered as a social innovation to address the adverse impacts of climate change as well as for identifying the best local adaptation practices. CAPA groups, which can be considered as grassroots initiatives for the vulnerable communities or community forest user groups (CFUGs) in Nepal, promote social innovations to foster the resilience of forest ecosystems and engage local people to satisfy their daily needs. Several vulnerability assessment tools are used to prepare the community adaptation plan for action, to address the problems of social and ecosystem vulnerability. Therefore, this study analyses the best practices of such CAPA groups during the preparation of local climate adaptation strategies in response to actual or expected climate impacts to increase the resilience capacity and ensure sustainability of their livelihoods.

1.2. Tools and techniques in adaptation planning in Nepal

Climate change is a complex problem interacting with different processes and the use of a mixed-method approach permits a holistic understanding of the different dimensions of the problem (Adger et al., 2009). Climate adaptation tools have been developed and applied by bilateral, multilateral and.

non-governmental development organizations (UNFCCC, 2005, 2007; Nkoana et al., 2017).

Several tools and methods are used for gathering information about current and future community vulnerability exposed to hazards and risks of climate change, as well as the adaptive capacity in developing CAPAs in Nepal. Hazards mapping, seasonal calendar, historical timeline, vulnerability matrix, and stakeholder analysis are mostly used in building people's understanding about climate risks and adaptation strategies. They support in developing the CAPAs by identifying contextual information related the identified hazards and their impacts on livelihood assets and adaptive capacity. Such tools also empower local communities and enhance dialogue within the communities as a solid foundation for the identification of practical strategies to facilitate community based adaptation to climate change (Bishwakarma, 2010). The assessment and evaluation of adaptation strategies have become more inclusive over time and need to link future climate change with current climate risks and other policy concerns (Füssel, 2007). Different tools are proposed for supporting the selection of appropriate adaptation actions to reduce the adverse effect of climate on human health, livelihood and well-being, and to make the community capable of practicing the climate change adaptation measures (e.g. Care Int. and IISD, 2010; LFP, 2010; Care, 2012). Füssel (2007) drew lessons about adaptation planning and highlighted the unprecedented methodological challenges because of the uncertainty and complexity of the hazard. However, while there is no single tool or approach for assessing, planning and implementing adaptation to climate change, some robust adaptation principles have nevertheless emerged (Füssel, 2007). The tools/methods for any situation largely depend on how local stakeholders and facilitators understand the socio-ecological system, their ability to win trust and build a good rapport with local stakeholders (Khadka and Vacik, 2012a, 2012b; Vacik et al., 2013) and their understanding of system dynamics (Hujala et al., 2013). In the development field, evaluating the effectiveness of adaptation strategies is highly demanded from donors, who are eager to know the success of their investments (Schipper et al., 2010). Climate adaptation tools should incorporate a component of sustainability assessment as a final stage prior to the implementation of adaptation action plans (Nkoana et al., 2018). They should help to address socially relevant problems, through joint knowledge integration and mutual learning (Nkoana et al., 2018), produce robust knowledge including both scientifically valuable and relevant information for the societal progress (Schmidt and Pröpper, 2017; Schuck-Zöller et al., 2017; Schneider and Buser, 2018).

Most of the approaches, methods and tools are used to assess vulnerability and adaptive capacity, which rely on socio-economic and bio-