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Local Farmers' Financial, Economic and Social Institutions' Role in Promoting Adaptation Strategies to Climate Change in Ethiopia

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ABSTRACT

Climate change is expected to have particularly a sever effect on communities in Sub Saharan Africa (SSA). Rural households and institutions often respond to these impacts by pooling individual and collective strategies that build their resilience. Adaptation to climate change may be largely shaped through local institutions such as financial, economic and social organisations operating at a village level. Using focus group discussions, key informant interviews and survey methods, this paper address the research question how local institutions facilitate the use of adaptation to climate change through Farmer Organisations (FOs) in Ethiopia. Findings show that farmer organisations do not only foster rural economic development, but also promote adaptation to climate change through livelihood diversification, communal resource pooling and market exchange. Each type of adaptation strategy is facilitated through both formal and informal interactions between public, civic and private organisations, implying the latter distinction among local institutions is blurred in practice. This shows that FOs are highly localized, complex networks that link multiple local organizations operating within and outside the boundary of the village in fostering the adaptive capacity and adaptation to climate change.

Such types of partnership exit at multiple-scale and have been used as vehicles for flow of information and sharing of resources that facilitate collective responses to climate change. Policymakers should account for these multiple links among and between farmer organisations, and higher level rural organisations in promoting adaptation to climate change.

Key words: Financial, Resilience, Adaptation, dynamic.

1. INTRODUCTION

Climate change is one of the biggest threats to agriculture dependent communities in Sub Saharan Africa (SSA).It has been projected that climate change will reduce crop production in SSA by 10–20% by 2050(Adimasu et al. 2014). This volume of reduction will be largely caused by an increasing rainfall variability and extreme events such as droughts and floods (Ombogoh et al. 2016).Such adverse climate change impacts may converge with the other socio-economic stresses such as widening economic inequality as a result of rampant poverty, frequent natural resource conflicts due to scarcity that lead to acute food insecurity in SSA (Shiferaw et al. 2014). This convergence could lead farmers in this part of continent to reach a tipping point in which they experience irreversible economic, social and environmental collapse (Biermann 2009). To prevent this, much attention has been given to climate change adaptation as planned process, managed through new policies, and development interventions(Callo-concha 2016). Climate change impacts have been constantly stimulating the development of several adaptation interventions, including varietal selection, crop diversification, weather forecasting and early warning systems in SSA (Shiferaw et al. 2014). Some of these strategies are performed by individual farmers, often triggered by specific climatic events such as seasonal rainfall change, whilst others are promoted through national level research and government agencies that lack adequate capacity for timely delivery of location-specific climate change adaptation information or technologies to the farmers (Chhetri et al. 2012). Although the latter approach isa useful precursor for identifying potential coping and mitigation points, climate change adaptation process is more viewed as simple technological responses to biophysical conditions than social phenomena that shape these responses(Callo-concha 2016). Consequently, the processes of climate adaptation have not been fully recognized by policymakers, researchers and practitioners at a local-scale, where these practices are embedded within local

institutions, including norms, rules and organisations(Brugger and Crimmis 2014).

Local institutions (hereafter treated as organisations) play a key role in reducing uncertainty of climate change by pooling collective expectations through developing dynamic interactions(Cuevas et al. 2015). Consequently, climate change adaptation research has shifted to examining the effect of social and institutional stresses on guarantying household food and livelihood security (Rodima-Taylor et al. 2012). Effective interactions between farmers and their institutions have become essential for reducing uncertainty beyond climate change(Chhetri et al. 2012). Depending on socio-economic and institutional contexts, they perform a range of activities, including pooling of communal resources for maintaining water canals, regulation of water distribution and allocation, and resolution of conflicts through monitoring and enforcing rules. These local institutions have historically been instrumental for enhancing agricultural productivity while safeguarding natural resources, including the protection of forests and watersheds from adverse climatic impacts(Gentle et al. 2013). Integrating local institutions into climate science implicitly acknowledges adaptation as coupled social-technical process that spans time-frame from the momentary to life time(Chhetri et al. 2012). These multidimensional and dynamic integrations within which climate change adaptation processes and practices are embedded would shape how they are enacted (Mubaya and Mafongoya 2017). Such embeddedness of institutions calls for a more comprehensive approach that combines both institutional and technological dimensions of responses to climate change. In addition to promoting farm level adaptation practices(Berman, et al. 2012), institutional access and articulation are crucial for developing social interactions among farmers and groups(Cuevas et al. 2015). These interactions between farmers and their supporting institutions are likely to be most effective in areas where local institutions such as women groups, community forestry groups, and labour sharing associations are active. Such understanding would be essential to recognize that farmers are more than just individuals who perform specific planned technical solutions to reduce uncertainty associated with climate change(Crane et al. 2011). The success of climate change adaptation largely hingeson the broad function of local institutions and how they transform individual and collective capacity into actions in the face of adverse climate impact Callo-concha 2016).

Most research towards agricultural adaptation usually tends to focus on technical options or infrastructural alternatives to reduce climate change impacts and vulnerability Shiferaw et al. 2014).These studies concluded institutions as one of the social factors that influence adaptation to climate change, with limited understanding on how these institutions facilitate the capacity of farmers to adapt to this change. Consequently, empirical information on the roles of local institutions to different forms of climate change adaptation strategies is scarce in SSA. The present study explores how LFIs can help shape and enhance adaptation to climate change and mediate external interventions relevant to climate change adaptation in three districts of Ethiopia. These types of organizations are in a key position to help communities build adaptive capacity by creating opportunities for collective learning and action through linking communities with external institutional systems.

2. OBJECTIVES OF THE STUDY

- To identify the local financial, economic and social institutions and their function in the study area.
- To assess the role of local financial, economic and social institutions involved in promoting adaptation to climate change in the area.

3. RESEARCH METHODOLOGY

Climate change mainly affects rural communities and their livelihoods in SSA. Adaptation to these impacts may be shaped by local organisations. Our study is conducted in three districts located in Wolaita Zone of Ethiopia (Fig 1), largely characterized by an increasing temperature, rainfall variability and recurrent droughts and flood incidents that treat food production in the area. Population pressure and continuous cultivation have caused land degradation and soil infertility, which consistently culminate in very low yields for the locals. This situation is also compounded by the rugged topography, which is largely not amenable for crop production, leaving massive food insecurity challenges. To counteract these challenges, both individual farmers and local organisations are performing several livelihood adaptation interventions such as crop diversification, soil and water conservation and varietal selection. We focus on three districts, namely, Humbo, Offa and Sodo Zuria, because they all cover major agro-ecological zones of the study are a semiarid, sub-humid and humid, respectively. Each type of agro ecological zone reflects rainfall, temperature and soil moisture distributions of the study area.

Such type of agro-climatic factors can be a proxy for describing the level of climate variability and agricultural production potentials. The characteristics of each district offer interesting contexts to investigate how local institutions facilitate smallholder farmers' capacity to adapt to climate change while building their resilience.

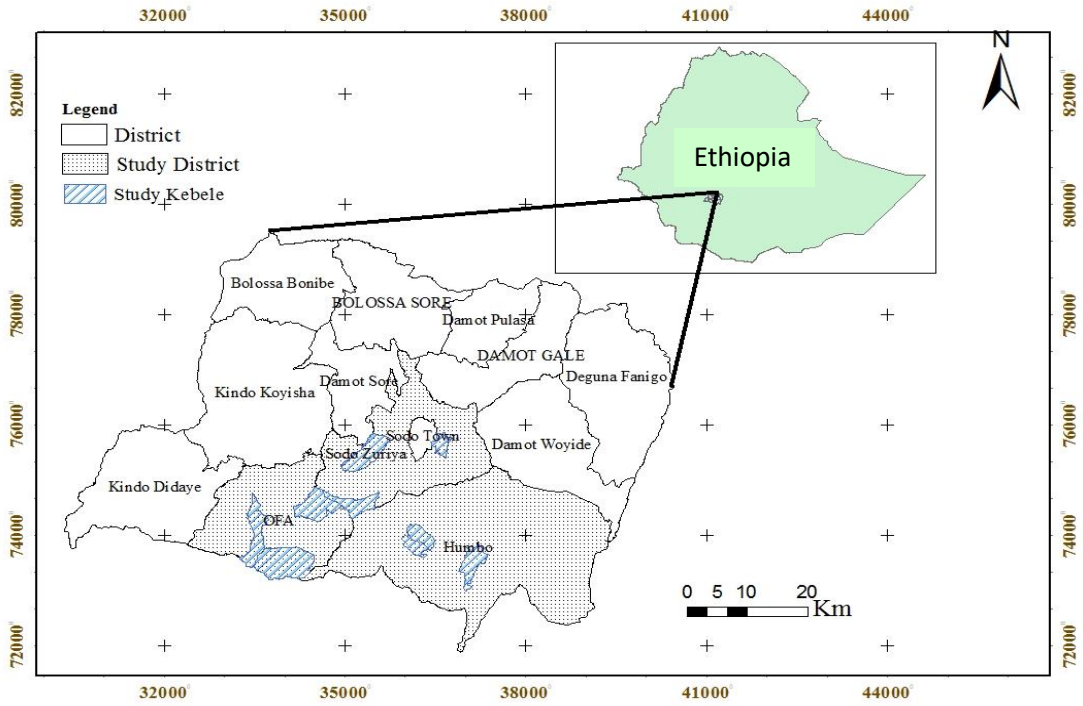

Figure 1: Map of the study area. (Source: Wolaita Development Association WoDA 2015)

Our study relied on mixed approach, both quantitative and qualitative data analysis. As for the first method, two villages from each study district were purposively selected, considering the availability and diversity of LFIs relevant to climate change adaptation. An organisational survey was conducted on the type of LFIs that operates in each selected village. Data were collected through semi-structured questionnaires that focus on two sets of questions: (1) basic functions of LFIs; and (2) the type of climate change adaptation strategies promoted through these organisations in the study area. We used, among others, qualitative methods such as Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs). The FGDs (two in each village) were conducted by covering smallholder farmers, community leaders and members of the LFIs. Participants of the FGD were randomly selected with the support of local leaders based on their length of experience in farming, membership status in LFIs and extent of knowledge about the study area. Within this context, participants were asked to list LFIs that operate in their areas

and what functions they play, how these organisations interact with households and interlink among themselves and other extra-local organisations relevant to climate change adaptation. Based on these criteria, scores (on a scale of 1–10, with 1 represents the least and 10 indicates the highest extent of provision of the criterion) were allocated for each LFIs based on the group consensus reached by the participants of the FGD. The KIIs were employed to complement and validate data collected through the other method. These key informants covered local experts, cooperative officers, community leaders and NGO staffs working in the study districts.

4. RESULT

4.1. Types of Local Farmers' Institutions and Their Major Functions

Results show that LFIs are not only promoting livelihood development, but also facilitating towards adaptation to climate change in the study districts. These types of multidimensional functions and mandates of LFIs are more pronounced in semi-dry and sub-humid areas than humid area. Table (2) presents the type of LFIs, major functions and their ranks about both livelihood development and climate change adaptation in the study districts. In the FGD, participants indicated that specific functions related to climate change adaptations are largely fostered through public and civic organisations. Among these types of organisations, the Water User Associations (WUAs)are ranked first in facilitating irrigation water use and thereby adaptation to climate change in the time of dry and rainfall constrained seasons. This type of water management regime boosts crop yields per unit area through increasing soil productivity while building resilience capacity. In a similar context, Reforestation Cooperatives (RCs)have been established for promoting forest restoration through planting trees in areas degraded by flash floods. In addition to reducing the effects of erosion, planting trees on the marginal land has brought additional opportunity for farmers to earn carbon credit payments as off farm income in Humbo district. These payments also help them purchase farm technologies such as drought-resistant maize varieties and fertilizers that increases productivity while building resilience to climate change. Farmers Research Groups (FRGs) have been also facilitated the latter functions through on-farm participatory research by covering scientists, agricultural extension workers and farmers. These types of collaborative research activities are important to innovate and develop sustainable climate adaptation process and practices by integrating transdisciplinary knowledge into scientific investigations.

Decisions to participate in these types of groups are made by farmers themselves through realizing their own personal needs and preferences as well as farm features such as soil quality. Most of private institutions promote functions targeted towards dealing with development challenges such as financial (e.g. credit, saving, transaction and insurance) constraints that reduce the adaptive capacity of communities (see Table 2).These types of institutions are formal Microfinance Institutions (MFIs) and Rotational saving and Credit Groups (RSCGs). Each institution facilitates access to microcredit service for marginalized farmers with poor collateral that would not allow them to receive the latter service from banks. These credit services do not only help them purchase farm inputs such as ploughingoxen during the wet seasons, but also allow them to diversify into non-farm activities such as retailing, weaving and carpentry during the dry seasons. Cart Transport Associations (CTAs) promoted on key pulling cart transport services for mobilizing agricultural produce such as maize to nearby markets.

Table2. Functions performed by Local farmers' institutions in the study area

Type of LFI	Major function	Score/10	Rank	Location
Public				
FRGs (F)	Disseminate technologies and innovations related to crop varieties through joint experimentation	6	6	H, O and SZ
FTCGs (F)	Provide technical trainings related to soil fertility and crop variety management for farmers	8	3	H, O and SZ
Civic				
RCs (F)	Establish forests on degraded lands Collect carbon credit payments from WVE	9	2	H and SZ
JCs (I)	Plant *Jatrophacarcus* seedlings to reduce erosion effects in marginal lands	7	4	O
WUAs (I)	Distribute irrigation water efficiently among communities	10	1	H and O
RSCGs (F)	Offer service of money saving, distributedin the face of crop failure due to severe floods and drought events	3	7	H, O an SZ
KCAs (I)	Distribute food aid for chronically food insecure households	4	6	H and O
PRCs (I)	Raise household income by supplying poultry eggs and meat to the local market during the dry seasons	2	8	O
FCs (I)	Raise household income by supplying fish for local markets during the wet seasons	1	1	H
Private				
CTAs (I)	Provide transportation services to nearby local markets through renting back animals-donkey	3	7	H and O
OMIs (F)	Provide credit and saving facilities for clients in rural	5	5	H, O and

	areas			SZ
TIGS (I)	Provide food grain sharing for groups, kinships and families during the crop-failure because of erosions	4	6	H and SZ

where F indicates formal, I represent Informal, and H is Humbo, O indicates Offa and SZ is Sodo Zuria district

These types of service facilitate market exchange activities by reducing time and labour costs, and consequently by increasing household income. Such types of services also help some informal organisations to mobilize emergency food aids (especially grains and canned oils) for farmers affected by recurrent droughts causing food insecurity. For instance, the Kalehiwot Church Association (KCA) largely promotes the latter type of services in transporting maize grain aids for the farmers affected by extreme climatic events such as floods resulting in crop failure.

4.2. Major Livelihood Adaptation Categories Facilitated Through LFIs

Our results show that most of climate adaptation strategies identified are promoted by LFIs in the study districts. These types of adaptation strategies are broadly categorized into livelihood diversification, communal pooling, market exchange, storage and mobility (Agrawal 2008). Each major strategy has several types of sub-strategies that clearly contribute to climate change adaptation. Table (3) summarizes major climate change adaptation strategies, specific climate change adaptation strategies and their percentages in the study districts. Livelihood diversification strategies such as off-farm income activities, including metal works, blacksmithing and animal bartering are promoted by45.7%of LFIs. Such activities that diversify livelihood activities largely help farmers to cope with and adapt to recurrent drought events. For instance, enhancing farm income through raising poultry during the dry season are promoted by Poultry Raising Cooperatives (PRCs). Other diversification strategies such as raising household income through rearing meat goats are fostered through Goat Raising Cooperatives (GRCs). These types of adaptation strategies are more pronounced during the recurrent drought seasons. Findings show that communal pooling strategies are performed by 28.6% of the LFIs. As joint activity, these types of practices require a strong sense of commitment and ownership on the part of members of the LFIs (Agrawal and Perin 2008). In the context of flood incidents, for instance, planting trees in degraded areas are largely practiced in Humbo district. These types of reforestation activities are also facilitated by Jatropha Cooperatives (JCs) that grow drought-resistant and oil-bearing Kobo

(*Jatrophacurcas*) trees in marginal areas of Offa district. Such types of plantation activities have essentially two-pronged benefits: (1) raise household income through selling of Jatropha seeds to biodiesel producing companies; and (2) maintains oil fertility and nutrients from erosions. Market exchange activities, including traditional insurance provisions as climate change adaptation practices are promoted by 14.3% of LFIs. This service is traditional because of the family and kinship ties associated with it. For example, food grain sharing as a traditional insurance mechanism because of crop failure caused by flash floods, is largely facilitated by Traditional Insurance Groups (TIGs). These types of groups foster adaptive capacity when members store grains before occurring of the hazard.

Table3. Major and specific adaptation strategies facilitated through LFIs in the study area

Adaptation type	Percentage	Specific adaptation strategies
Diversification	45.7	Increase the time of off-farm working Choice of crops Provide saving and loan services Produce timber for house making Promote poultry and goat production
Communal pooling	28.6	Construct rainwater harvesting wells Divert river water for irrigation Restore degraded lands through reforestation Conserve soils from erosion through bund and check dam construction
Storage	11.4	Store irrigation water Improve the storage of crops through pest control
Market exchange	14.3	Purchase drought resistant crop seeds Provide crop seed market information Purchase fertilizers
Mobility	1	Provide transportation services to agriculture products such as avocado

Storage of food crops for long-time is promoted by 11.4% of LFIs. For instance, maize storage is largely performed by constructing common storage facilities from local materials such as wood that prevents the grains from pest attacks. Such types of practices would help farmers guarantee food availability as well as accessibility in the face of drought incidents. Food accessibility in the local market is also facilitated through local transport service associations that promote mobility.

4.3. Linkages between Households and LFIs

In the FGDs, participants highlighted that all the LFIs have been part of a network of social structures and organisations. Such types of social networks are attributed by financial, technical, informational provisions that facilitate the capacity of communities to adapt to climate change. The inclusiveness of LFIs is reflected through the nature of the partnership between these organisations with non-members. These types of networks and partnerships among households and LFIs have largely pronounced during collective planning of communal pooling strategies such as terrace preparation. Although some types of LFIs, particularly that of public institutions have linked with households and groups while providing microcredit information. Participants also noted that involvement of these communities in collective decision-making process has been yet limited. This type of poor participation in decision-making has an implication for implementation of the functions noted in (Table 2) as the success of these activities in part hinges on successful partnerships with communities for managing natural environment(Agarwal et al. 2012). Participation of households and groups in LFIs operating on climate change adaptation was largely conditioned by level of vulnerability to climate change. The FGD participants noted that more vulnerable households to climate change have participated less in LFIs due to poor capacity to adapt to climate change. For example, female-headed households have less participated in LFIs than male-headed counterparts. Those women participating in LFIs had previous experience in organizing, often in informal associations such as saving groups. In general, participants described that lack of access to training and information, organizational rules and norms, access to financial assets, household's preferences and motivations were identified as the main barriers from participating in LFIs.

4.4. Linkages between LFIs and Extra-Local Institutions

Multiple partnerships among public, civic and private organisations fostering the adaptive capacity of communities were reported by the key informants. These types of linkages are largely pronounced between public-private partnerships in terms of credit provisions, technical training related to soil and water management and market information exchange. For instance, government agencies at national-level offer training related to financial management and institutional governance for the MFIs that provide microcredit services. This type of financial provisions facilitates the adoption

of income diversification practices such as animal fattening performed by civic organisations. This implies that private organisations are also interacting with the latter type of organisations. The effectiveness of farmers' irrigation water utilization provided by WUAs is more pronounced by the adoption of drought-resistant crop variety fostered by FRGs. In addition to the horizontal interactions, there appears to be significant vertical linkages between LFIs and extra-local institutions at a scale. For example, key informants noted that RCs are financially funded by WVE at national level while technically coordinated by DANRO at local level. This type of interplay between LFIs and higher-level organisations has created a good pathway to reach most vulnerable groups to climate change.

5. DISCUSSIONS

Our study shows that LFIs ranging from informal traditional groups to formal cooperatives have played a critical role in facilitating adaptation to climate change. Consistent with previous studies(Washington-ottombre and Pijanowski 2013) we found that local LFIs promote adaptation to climate change while facilitating livelihood development. The latter functions further imply that LFIs are clearly formed to address both developmental and environmental challenges. They are characterized by local, specific and evolving structures and functions. Most of RPO facilitating adaptation to climate change were largely concentrated around public and civic institutions. Each type of organisation largely promotes climate change adaptation by collectively managing natural resources such as irrigation water and forests in the face of increasing rainfall variability. Such types of joint action on water and forest management may help diversify livelihood sources while pooling individual and collective experiences in responding to climate uncertainties(Callo-concha 2016). In addition to improving cash income, collectively managing natural resources provide improved ecosystem services such as food, medicine and shelter for the communities(Brown and Sonwa 2015). Most of these organisations are mainly concentrated in Humbo (semi-arid areas) district, followed by Offa (sub-humid areas) districts and Sodo Zuria (humid areas)district (Table 2).This variation was due to high levels of exposure and sensitivity to climate change, which exceeds the current capacity of individuals and groups to adapt to climate change. These climatic risks calls for an urgent response from households, groups and organizations by pooling individual and collective responses against vulnerability to climatic risks, as adaptation to climate

change is a multi-actor process whereby several stakeholders participate(Adger et al. 2005).The stream discourses of climate change, largely impacting the livelihood of rural households have been structured by LFIs. The most crucial type of climate adaptation practice facilitated by LFIs in the study districts was livelihood diversification such as carpentry. This type of strategies reduces climatic risks across assets owned by individuals and collectives(Wang et al. 2013). Findings indicate that household income diversification activities such as poultry rising were promoted through the Poultry Producer Cooperatives (PPCs. Communal pooling of resource was the second most cited adaptation strategies fostered by LFIs. Making collective action to maintain shared benefits from communal resources, is a kind of self-organised cooperation for pooling climate risks across individuals and groups. Joint action has more increased the range of climate change impacts and adaptations than individuals that separately respond to climate change. Such types of collective activities were largely performed for managing the natural resource (e.g. forests) in the study districts. Tree planting on degraded lands (with no dominant vegetation cover), or highly exposed to floods through communal pooling was performed in Humbo districts. This type of reforestation activity does not only reduce the effects of flood incidents, but also contributes to the emergence of small ponds and streams. Irrigation water use was also promoted through pooling individual and collective capacity to maintain and operate water wells. These have several implications for increasing productivity, building resilience of both humans and ecosystem and mitigating greenhouse gas effects. This was also similarly highlighted by the study of Wang et al. (2013) that focus on climate change adaptation, local institutions and rural livelihoods of herder communities in Mongolia. Market exchange was also an important adaptation strategy promoted through LFIs in the study area. Reciprocal exchange systems through traditional insurance schemes among social groups in the face of crop failure due to erosions were the main market exchange activities in the study districts. Food grain exchange systems among households whose properties or crops are already destroyed by floods were promoted by Traditional Insurance Groups (TIGs). Such types of exchange practices may be more facilitated by storage strategies, i.e. storage of food crops for long-time by consuming less. As an adaptation practice to address risks, storage activities may be relevant to individual farmers and communities to address food as well as water scarcities in the face of recurrent droughts(Washington-

ottombre and Pijanowski 2013). This food reserve practice has helped farmers adapt to climate change during the dry seasons pooling or avoiding risks across time. As climate changes rapidly, a focus on wider partnerships between stakeholders in the co-production of adaptation knowledge is critical (Rodima-Taylor et al. 2012). Key informants noted that the link between households, social groups and LFOs was more pronounced during extreme climatic events such as recurrent droughts and floods. Most of these interactions were complementary in facilitating adaptive capacity of communities. These linkages were largely reflected by LFIs whose functions go beyond membership status to include sharing of climate adaptation information. This type of service was mostly facilitated through collaboration among formal MFIs and informal RCSAs. The KCAs is also promoting emergency food (e. g. mostly grains and canned oils) aid services through collaboration with private institutions such as CTAs that offer donkey pulling-cart services. This type of partnership does not only reflect formal interactions among public, civic and private organisations, but also indicates informal linkages among the latter organisations in facilitating adaptation to climate change. This implies that local organisations are highly localized, complex and diverse networks that link multiple social groups and organizations in fostering adaptation to climate change.

6. CONCLUSION AND RECOMMENDATIONS

Our study shows several types of LFIs that structure vulnerability to climate change while shaping responses to this change. Most of these organizations are concentrated around public and civic institutions that promote livelihood diversification, communal pooling and market exchange. Each type of strategy has become complementary and crucial for increasing productivity while building the resilience of communities in the face of climate change. Climate-related information and resources may never be accessed by farmers themselves without linking with individuals and local organisations. These collaborative relations are interdependent involving both formal economic exchanges and informal social ties that depend on personal trust. Such type of partnership between endogenous farmers and locally-initiated organisations may promote local adaptation strategies and capacity to adapt to climate change. Support for such partnerships can greatly enhance informal institutional processes that shape adaptation to climate change. Partnerships among local public and civic institutions are associated more closely with climate adaptation strategies related to livelihood diversification and communal pooling.

Partnerships between private and civil institutions are relatively poor and need encouragement despite promoting exchange and storage-based adaptation practices.

LFIs have also been part of extra-local organisational networks with accountability that go beyond village level. Such types of partnership exit at multiple-scale and have been used as vehicles for flow of information that facilitates the adaptive capacity of communities. Local adaptation strategies are increasingly interlinked with institutions and organisations at national level. The very notion of local organisation and extra local organisation constituting a dichotomy is, in fact, incorrect, because society is an open system that exchange information and resources across multiple scales. Through this process, local and global understandings and practices of resilience building become mutually constructed. As climate change is being beyond local response capacity, more broad collaboration between local organisations, government agencies and donors may be crucial to reduce the impacts of climate change. More research may be needed to understand how national scale public, private and civic type of organisations develops partnerships in promoting adaptation to climate change.

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