

STRENGTHENING LOCAL INSTITUTIONS AS AVENUES FOR CLIMATE CHANGE RESILIENCE

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ABSTRACT

In Africa, poverty and food insecurity is pervasive due to intertwined factors including, declining crop yields, land degradation, and inadequate policy and institutional support. With ever increasing populations, climate change effects will be intensified, and a major crisis is inevitable unless measures to sustain land resources are urgently taken. Weak grassroots institutions characterized by low capacity, failure to exploit collective capital and poor knowledge sharing and access to information, are common barriers to sustainable land management and improved food security. This paper argues that vibrant rural institutions are necessary to ensure food security and environmental protection, consequently contributing to climate change resilience. It demonstrates the role of institutions by evaluating two types of institutions and their impacts the 'status quo' and 'hybrid' institutions using case studies from the African Highlands Initiative in Uganda and IFRI in Kenya. It further discusses a model that highlights factors affecting smallholder investment in natural resources management and how these can be used to strengthen local institutions in building their resilience against climate change effects.

Key words: *climate change, local institutions, resilience*

INTRODUCTION

Sub Saharan Africa is plagued with poverty and undernourishment due to complex interactions of many factors including declining crop yields, land degradation, poor infrastructure, and inadequate institutional support. The economic output of the agricultural industry is steadily decreasing, (1 tonne per hectare for most staple grains) (Rockstrom and Falkenmark, 2000) while the gap between agricultural production and population growth is increasing. The continent's population is growing at an annual rate of approximately 3% while food production lags behind at the rate of 1-2% (ACT, 2008a). Logically, food production must double by 2030 if hunger and starvation are to be avoided (ACT, 2008b). However, in a world where agriculture is increasingly commercialized, sub-Saharan Africa (SSA) is, to a great extent, trapped in subsistence farming where perennial over-grazing; deforestation and unsustainable land use practices have led to a deteriorating physical environment, depleted of the carbon that is the cog of the agricultural productivity wheel. Soil structure has been damaged, allowing fertile top soil to erode easily. Aridity and desertification are increasing as extreme

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weather patterns lead to flooding, drought and others, exacerbating soil destruction. Approximately 65% of agricultural land in SSA is subject to degradation (UNEP/ISRIC, 1991; GEF, 2003). The 80% rural agricultural communities are thereby locked in poverty, food insecurity and excessive reliance on available natural resources and food aid. Despite these, local communities in general, have developed coping mechanisms to climate risks which include crop diversification, migration patterns among the nomadic and semi nomadic communities, and planting trees on farms that are well adapted to drought/floods among others. They have survived shocks from natural calamities and market failures, no matter how impoverished they are. But with increased globalization of climate change risks, increased public expectations on ecosystems services, and the growing impetus for decentralized natural resource governance, local communities need to be better mobilized through effective institutional mechanisms, to build resilience to climate change effects. On the other hand, local institutions are facing challenges and pressures on their adaptive capacity to fill the gaps and address various issues facing small holder farmers. Local institutions should thus play a much bigger role through networking and information sharing on adaptive technologies and management options; this further requires policies and programs created to sustain their agility to cope and adapt, and therefore mitigate climate change

To ensure that climate change risks are addressed at the local level, it is important that there be local institutions with capacity to play a role in natural resource management. Andersson (2002) recognizes the importance of institutions in realizing resilience of natural resource dependent communities. He argues that although decentralization may bring important opportunities for forest dependent communities to get more and better public services to improve the quality of forest governance; the delivery of this “possibility of decentralization” depends to a great extent on the performance of local human institutions in place. In Andersson (2004), he continues to illustrate the importance of well-functioning local institutions for effective decentralized forest governance and concludes that positive outcomes are associated with the strength of local institutions for downward accountability. However, the existence or emergence of local institutions is not a panacea to successful natural resource management—they are only a necessary beginning (Scherr et al. 2001); they need continuous support for capacity building and bridging efforts to link up with higher-level decision-making processes and the broader markets, before they can be expected to mobilize groups to transform into resilient communities

This study examined two cases of local institutions, which are under the facilitation of the African Highlands Initiative (AHI) in Uganda and the International Forestry Resources and Institutions (IFRI) in Kenya to demonstrate the importance of local institutions.

CONCEPTUAL BACKGROUND

Local communities and institutions in climate change

Studies conducted by the International Forestry Resources and Institutions (IFRI) and African Highlands Initiative (AHI) have shown that rural communities in East Africa are highly inequitable and differentiated. The differentiation is mostly socio-cultural and economic, leading to unequal access to, and control over land and other resources between people of different economic and social groups. Most people therefore live in poverty and are highly dependent on natural resources. Small-scale agriculture, forestry, fishery, carving are livelihood options for most individuals. These types of livelihoods are highly vulnerable to changing weather conditions that affect their crops, animals, water sources and other natural resources. For instance, excessive rainfall, drought, poor soils, changes in cropping patterns, flooding, fires and others have direct effects on households. Rural poor communities are therefore often the ones most severely affected by climate change impacts and yet they are the least equipped to cope and adapt (UNDP 2008, Orindi and Murray 2005). The situation is exacerbated by the limited capacity of local communities to diversify their livelihoods using available natural resources (Battista and Baas 2004).

Climate change can be mitigated through reducing greenhouse gas emissions, increasing carbon sequestration and carbon substitution (Pokharel and Byrne 2009) which are all directly related to trees. But such technical solutions have social and policy dimensions--- through effective inclusion in decentralization programmes, local communities are able to play a big role in climate change mitigation through preventing deforestation and forest degradation. In East Africa, the Reduction of Emissions from Deforestation and Forest Degradation (REDD) scheme is becoming popular, with more and more communities expecting to benefit from it. Hopefully, the scheme will offer financial services to communities for reducing deforestation and forest degradation. Those who are likely to benefit will do so, through their existing local institutions, although the efficiency and fairness dimensions are untenable. Unless clarity of basic issues including 'forest definitions' and 'transaction costs' within the REDD scheme is achieved, increased marginalization through wealth and elite capture will create another order of social problems and climate effects will continue to inflict on majority of the rural poor. REDD should therefore not only focus its application on getting resources from carbon trade but also increase focus on adaptation measures.

'Informal' traditional institutions³ have played a key role across the African continent in survival, social learning and support, labor sharing, risk sharing, planning and implementing development activities, and have more recently been harnessed to foster

³ For purposes of this paper, we refer to 'institutions' as organized social structures that use 'complexes of norms and behaviors that persist over time by serving collectively valued purposes' and either prohibit or permit specific types of actions. They are responsive to opportunities and crises such as climate change effects. Institutions in this case have been classified in terms of their functionality and the services they offer such as market efficiency, claims/lobbying and Pro bono functions. (Thorpe *et al* 2005)

local communities' resilience against climate change effects. In their study of the Philippines, Gabunada and Barker (1995) found that membership in networks was positively correlated with adoption of soil conservation technologies. Nyangena (2004) found that households with more social capital had better ways of alleviating constraints and sharing information leading to more soil and water conservation adoption. Allen *et al.* (2001) concluded that social capital plays an important role in fostering social networks and information exchange - and in sustaining a social and institutional environment that is ready to adapt and change. Jagger and Pender (2006) hypothesized that households with agriculture or environment focused programs or organizations were more likely to adopt land management technologies even if not directly involved in such organizations, due to spillover effects. Friis Hansen (2008) partly corroborates this when he noted close relationship between participation in farmer groups and effectiveness of agricultural production. However he claims that a significantly higher percentage of farmers who were members of groups adopted and used improved techniques for soil-erosion control, soil-fertility management, and pest management than did non-members. Dorward *et al* in Kirsten *et al.* (2009) also note that institutions and institutional change are critical in determining the ability of farmers to respond positively to new challenges and opportunities. This indicates the importance of institutions in fostering household capacity to diversify livelihoods and adapt to climate change.

In this study, we found it helpful to identify types of local institutions based on their functionalities and the services they provide to individuals or group members. These functions strengthen the communities through their activities towards climate change resilience⁴. The functions have been categorized into three, recognizing that particular groups often perform more than one function at a time: i) efficiency functions (to overcome a variety of market failures and reduce transaction costs); ii) claims functions (to advance the claims of its members to power and/or resources e.g. lobby groups, trade unions, women's groups, associations of the poor, such as the landless); and iii) pro bono functions (to alter the distribution of benefits within society, but they are mainly directed towards individuals outside the group) (Thorpe et al 2005). The study focused on two types of institutions, which have been involved in various activities aimed at building the capacity of communities through diversification of income sources, reforestation and avoided deforestation among others. The paper also suggests a framework for transforming local institutions to functional institutions able to adapt to climate change effects.

⁴ In this study, we refer to resilience as the ability and access to information of local communities to seek and diversify climate change adaptation and mitigation strategies. Involvement of these communities in reforestation, soil and water conservation among others indicates some level of resilience. Resilient local institutions should have the ability to effectively adapt to changing situations and assist their members to adapt to the effects.

METHODOLOGY

This study was conducted in two institutions in Kenya and Uganda. It utilized a review of various literatures on typology and analysis of institutions in natural resource management (NRM) to characterize types of local institutions in NRM, and to design a potential model for strengthening grassroots institutions based on experiences in the field. It mainly utilized cases examined by African Highlands Initiative (AHI) and International Forestry Resources and Institutions- Kenya (IFRI-K). AHI employed a participatory action research method in data collection while IFRI-Kenya utilized the IFRI methodology of data collection which uses 11 different standard forms to collect forest, settlement, user group, associations and household data (refer to IFRI manual on <http://sitemaker.umich.edu/ifri/resources>). The IFRI program relates forest users and institutions through formal and informal interviews to collect information on numerous entities that influence forest use. Participatory Rural Appraisal (PRA) tools such as focused group discussions and interviews with key informants were also used to gather information on local farmer associations. For purposes of this study, we utilized the association and the household forms for information on local institutions.

These two case studies are a result of continuous interaction between researchers and the communities to evaluate their institutional development over years. Initial studies with communities in Kapchorwa, Uganda started in 2003 while studies with communities in Mt. Kenya started in 2001.

THE CASE STUDIES

a. Arokwo Growers Associations: a member of KADLACC

In Uganda, the study utilized data from Kapchorwa District, which is situated on the slopes of Mt. Elgon in eastern Uganda. The district stretches from an attitude of 600m above sea level (in the low lands) up to 3000 meters above sea level in the highlands. These are often steep and are facing severe soil erosion due to unsustainable farming practices and overgrazing. The local institution under study is the Kapchorwa District Landcare Chapter (KADLACC), a district level innovation platform made up of 11 community-based organizations involved in biodiversity conservation; KADLACC is recognized and supported by the local government. It can be said that with facilitation from AHI, KADLACC is the fruit of three years of efforts amongst local groups to create a higher level collective action which now involves farmer groups, NGOs, the local government among other partners; this is in realization that solutions to local problems can only be achieved through a holistic approach; the stakeholders together formed an innovation platform with a steering committee and a volunteer secretariat.

KADLACC's activities are focused on environmental issues where a multi-stakeholder support system is necessary. These include (i) collaborative management by facilitating negotiations between displaced communities and government on protected area management; (ii) watershed management through training, cross-site visits, linking

farmers to technologies and innovations, negotiation support, documentation and dissemination of success stories; (iii) facilitating farmer innovations and technologies by identification of technologies that match farmers' needs, resource mobilization; (iv) farmer learning and institutional development through conducting farmers' skill needs assessments, (v) marketing and enterprise development by developing market niche and opportunities for income generation and improved ecosystem health through product branding and lastly (vi) partnerships and networking by establishing supportive affiliations (Tanui et al 2007). KADLACC has played a major role in building the capacity of various local institutions to achieve resilience against climate change effects. The study centered on the Arokwo Growers Association, a member of KADLACC which collectively controlled landslides on the hilly slopes of Mt. Elgon through use of soil conservation measures. This was through the support and capacity building of the KADLACC platform.

Arokwo, Growers Association (AGA), is in Arokwo Village, Kapteret Parish, Tegeres Sub-county, and Tingey County in Kapchorwa district. It is located in one sloping side west of Kapchorwa town. Due to massive soil erosion, there were frequent landslides leading to destruction of crop, houses and other property including people's lives. This has resulted to declining soil fertility on the slopes and floods in the lowlands. This has been exacerbated by drainage of water and sewage wastes from Kapchorwa Town Council running downwards through Arokwo. These problems among others prompted members of the village to join together to actively control soil erosion through improved farming methods. Members of the village are involved in contour sitting and making trenches, agro-forestry practices and zero grazing to produce organic manure to make the farms fertile.

b. Community Forest Associations (CFAs) in Kenya

In Kenya, the study highlights 11 community forest associations (CFA's) across different ecosystems and focuses on a case study on Meru Forest Environmental Conservation and Protection (MEFECAP), an umbrella association which successfully restored the 'once' degraded eastern part of Mt. Kenya through Participatory Forest Management (PFM). The association has evolved from being a small unregistered group, to a large conglomerate association comprising of close to 50 member groups that are all involved in various forest management activities.

The Meru Forest Environmental Conservation and Protection (MEFECAP) was established as an amalgamation of several groups working in the forest to form an umbrella body. The CFA which is located in Meru district of Mt. Kenya operates in the Upper Imenti Forest Block in Mt. Kenya Forest. Membership in the CFA consists of members of the existing groups whose activities are related to forestry. The groups include protection groups, fuelwood collectors, grazing groups, groups involved with the construction of the solar electric fence, among others (Ongugo et al. 2007). The CFA has a steering committee with representatives from the KFS, Kenya Wildlife Services

(KWS), the Agriculture and Provincial Administration, and Meru Municipal, which monitors its activities. The steering committee spearheads implementation, monitoring, and evaluation of the organization in an advisory capacity.

The CFA mainly focuses on i) protecting the forest by assisting in patrolling and forwarding any information to the KFS that would assist in reducing destruction, ii) forest conservation through carrying out afforestation and plantation maintenance activities, iii) protect water catchment areas through planting of appropriate tree species, iv) uplift the standards of living of members of the participating groups by starting income-generating projects such as eco-tourism, bee keeping, grazing, and fuelwood collection and; v) educating members on the importance of forest and environmental conservation.

RESULTS AND DISCUSSIONS

LOCAL INSTITUTIONAL ANALYSIS IN CLIMATE CHANGE RESILIENCE

Our analyses of the cases are summarized through two categories or types of local institutions, their impacts on livelihoods and the environment and their ability to foster climate change resilience of local communities. These are: i) status quo local institutions which are plagued with a myriad of factors that affect their performance against climate change effects; ii) hybrid institutions which are an improvement from the status quo. The hybrid institutions are capable of assisting local communities adapt to climate change effects. These types of institutions are discussed in turn.

Status quo institutions

These types of institutions are often 'weak'; characterized by low capacity and poor leadership, governance and elite capture. These institutions also fail to exploit collective capital, knowledge sharing and access to information and are characterized by poor communication networks, poor linkages between grassroots institutions and higher level institutions and lack institutional coordination to respond to climate change situations. These attributes are some of the major institutional barriers to sustainable land management (SLM) and improved food security (Stroud et al 2006, Battista and Baas 2004). Their situation is exacerbated by inadequate natural resource management (NRM) systems and policy processes; and low levels of market integration; greatly undermining their ability to benefit from advances in agricultural and other natural resource innovations. Most institutions in SSA and East Africa fall under this category. AHI studies in Uganda have identified institutional weak points such as low institutional capacity in overseeing responsibilities related to NRM, lack of enthusiasm/motivation among community members on issues related to NRM and development, lack of information sharing and access, poor participation of communities in decision making, and poor linkages within the community and also with external actors. The resultant impacts are poor relations and poor or no impact in the groups, resource degradation due to poor management contributing to low crop productivity and income generation (Masuki et al 2009).

From the IFRI cases it was noted that some of the 'weak' institutions are more often than not hastily formed to meet some immediate benefits to be provided by a donor or government. Results indicate that groups from most forests studied in Kenya were formed between the period of 1998-2005 when the process of decentralization and participatory forest management (PFM) was introduced (Table 1). From focus group discussions with the groups, it was noted that most of them were formed with individual expectations of the benefits and incentives that were to be derived from participation in groups as stipulated in the Forestry Policy and Forest Bill 2004 and Forest Act 2005 (GOK 2004, 2005). Upton (2008) indicates that when there are immediate tangible benefits to be gained from membership of a group, it is likely to be dominated by 'non-poor' farmers – if the group-formation process is 'open' and guided by local elites. The groups are formed in the guise of inclusiveness of marginalized groups but in reality, these groups are more often excluded due to lack of information and resources for participation in groups. This promotes 'elite capture' where the more poor and needy members of the community are excluded from participation in group activities. Results from IFRI cases indicate that many groups (82%) were formed either by individuals or user groups most of which are the well to do in the communities. They were mainly driven by the individuals'/user groups' anticipated benefits (Table 1). Even in cases where the groups were initiated by user groups, these were mainly dominated by a small 'clique' of individuals who were relatively well off, and had access to information and resources. This relates to Upton's (2008) findings that group formation and persistence often involves a trade-off between economic viability and inclusiveness through which the poorest may be further marginalized and existing inequitable social relations entrenched. In one IFRI study, Ongugo et al (2007) noted that many communities had attempted to form associations because it was expected of them by the Forest Act that was to be newly implemented in Kenya. Although a majority of these groups were still in the primary stages of formation, their anticipation in getting involved in PFM was high.

Table 1: Formation of community forest associations in Kenya

| | Forest Name | Forest group/association | Year formed | Initiator of association | Type of institution |
|----|--------------------------|---|--------------------|---------------------------------|----------------------------|
| 1 | Gathiuru (Mt. Kenya) | Burguret river water user association | 1999 | Individual | Status quo |
| 2 | West Mau, Kedowa | Country vision | 1999 | Individual | Status quo |
| 3 | Aberdares Ranges | Geta Region Environmental Conservation Group | 2002 | user group | Status quo |
| 4 | Thimlich Ohinga | Got Olasi Youth Tree-farming Nursery project | 1994 | user group | Status quo |
| 5 | Ramogi Sacred Grove | Got Ramogi Alternative Health | 1999 | Local NGO | Status quo |
| | | Ramogi Eco cultural and Education Centre | 2002 | Governmental Program | Status quo |
| 6 | Kakamega Rain Forest | Isukha Heritage | 1995 | Individual | Status quo |
| | | Kakamega Community Forest Association (KACOFA) | 2005 | user group | Status quo |
| | | Kakamega Environmental Education Programme (KEEP) | 1995 | Individual | Hybrid |
| 7 | Kimothon (Mt. Elgon) | Kimothon Non-residential Cultivators | 2000 | Governmental Program | Status quo |
| 8 | Upper Imenti (Mt. Kenya) | Meru Forest Environmental Conservation and Protection (MEFECAP) | 1998 | user group | Hybrid |
| | | Michaka/ Kiringo Forest Conservation Project | 2000 | user group | Status quo |
| | | Ribui Kirachene Forest Operation Protection Group | 1998 | user group | Status quo |
| 9 | Tugen Hills Forest | Sochkei Self Help Group | 2002 | user group | Status quo |
| 10 | Vanga Mangrove Forest | Vanga community user group | 2000 | Individual | Status quo |
| 11 | Arabuko Sokoke | Arabuko-Sokoke Forest Adjacent Dwellers Association (ASFADA) | 1999 | User group | Hybrid |

Adopted from Ongugo et al 2007

IFRI findings indicated that weak institutions driven by self interests were least able to empower local communities adapt climate change effects. The economic and social effects to the communities in the two countries have been severe. For example, farmers attribute poor yields or crop losses either to rains arriving too early or too late and thus damaging crops or to inadequate flood control structures. Drought periods also have an effect on crop yields and subsequently affect food security. Strong winds/currents, floods and ocean water surges have also endangered both livestock and human life and affected infrastructure, personal property and irrigation systems in most parts of the two countries. Forest fires have also had an effect on forest conditions and reduced access to forest products in the case of Kenya. Although these effects are felt at the household level, strong institutional structure would mitigate some of these effects. However as a result of poor leadership, elite capture, poor governance and networking systems, most institutions are unfit to address the above effects. As a result, many communities have been excluded from access to information, resources and market opportunities, a few among the factors instrumental building the resilience of communities to climate change effects.

Further, status quo institutions tend to have exclusive membership and decision making, and have limited benefits accrued from membership in the forest associations. Increased awareness on participation in forest management served to increase wrangles between earlier formed groups and the newly formed ones. There were increased conflicts on who is to be registered as the legitimate community forest association (CFA) in the area with the older groups arguing for the first come first served basis. This has further delayed the full implementation of PFM since most communities and groups especially the special and marginalized such as the poor, women, elderly have no access to information, no linkages with higher level institutions. Consequently local community adaptation has been weakened since these institutions have failed to empower their members.

Hybrid Institutions

These institutions have some level of capacity in their effort to build the resilience of local communities. They are an improved version of the status quo institutions which have built on some lessons and experiences, while utilizing indigenous knowledge in natural resource management. Most of them have utilized indigenous technical knowledge in climate change adaptation. These positive characteristics, challenges and lessons are the building blocks towards this improved level of institutions. Most of the hybrid institutions represent local perspectives in policy making for more participation in policy dialogue, promote communication channels between higher and local policy levels, are able to guide and implement climate change resilience activities and mobilize local participation especially for rehabilitation activities. They however have limited capacity to handle extreme climate change events especially in cases of emergencies.

They require external assistance in terms of financial resources and technical backstopping to be able to succeed. In this section we discuss KADLACC and MEFECAP as examples of hybrid institutions. KADLACC has had community and landscape level impacts over the years. These can be summarized in Table 2 below:

Table 2: Added value of KADLACC

| | BEFORE | AFTER |
|----|--|---|
| 1. | NRM not mainstreamed in development initiatives but mainly carried out through lone ranger approaches | Integrated development and NRM planning from village to sub county levels, with the involvement and support of district Government |
| 2. | Limited access to development and extension services for a large number of households | Linking of farmer learning cycles to trained facilitators from various member institutions has improved widespread access to services |
| 3. | An aid and problem-focused attitude towards community level development needs | An appreciative intervention process building on local level assets and a spirit of volunteerism |
| 4. | Development efforts delinked from natural resource conservation and equity | A defined process for linking livelihood goals to conservation objectives and enhancing equitable benefits capture advocated for by community-based organizations and farmer groups |
| 5. | Role of local government in pro-poor, ecologically-friendly policy support process undefined, or unclear | Strengthened role of local government structures in integrated NRM planning; involvement of community members in policy reform |
| 6. | No clear direction for market development; livelihood needs seen as contradictory to conservation objectives | Strategies under development for enhancing linkages to markets in the context of environmental conservation |

Source: Tanui *et al* 2007

Through facilitation and capacity building of members of KADLACC (Table 3), the institution has been able to handle local problems using local solutions. Some of the problems it has been addressing include indiscriminate deforestation to create farm and settlement land, fuel wood and construction material, declining crop productivity due to poor soil fertility, conflicts between communities and protected area management, gender inequality, poor governance in pro poor and eco-friendly policy processes, poor markets and investments in NRM, inadequate budgetary allocations and poor accountability, poor social infrastructure and inadequate extension services due to poor information access.

Table 3: KADLACC member organizations and activities

| Organization | Activities |
|---|--|
| Bukwa Agro-forestry Farmers Association | Planting of fodder trees and napier grass along the contour bands Nursery establishment and management for agroforestry, fruit trees Soil and water conservation Horticulture |
| Tuban Organ Farmers Association (TOFA) | Apple growing and management Fish farming Use organic manure in banana garden zero grazing. |
| Tuikat Watershed | Fish farming, apple growing and management Collaborative management between the protected area and the community Policy – By-law formulation, Implantation, grazing rights and property rights. Soil fertility and water management Contour siting and construction Agro-forestry |
| Kaseko Soil and Water Conservation | <ul style="list-style-type: none"> • Promotion of fuel saving Technologies e.g. multi pot stove installation. • Soil fertility and water management • Contour siting and construction • Agro-forestry |
| Kaptoyoy Integrated Farmers Association | <ul style="list-style-type: none"> ▪ Soil fertility and water management ▪ Contour siting and construction ▪ Agro forestry –Planting of Grevillea tree seedlings along the contour bands |
| Kapchorwa bee keepers and Agro forestry association | <ul style="list-style-type: none"> ▪ Use of improved hives such as Langstroth and Kenya Top Bar hives. |
| Arokwo growers Association | <ul style="list-style-type: none"> ▪ Soil and water conservation through planting napier grass along the contour plants for fodder and for stabilizing the contour bands. ▪ Agro forestry |
| Chesower Integrated farmers Association | <ul style="list-style-type: none"> ▪ Soil fertility and water management ▪ Contour siting and construction |
| Kapchorwa community development Association | <ul style="list-style-type: none"> ▪ Supporting communities in the implementation of riverbank management law. ▪ Tree planting ▪ Contour siting and construction ▪ Provide alternative income sources along the river bank e.g. bee keeping, zero grazing |

Through the AHI programs (Table 3), several groups in KADLACC including Arokwo growers Association, have demonstrated some climate change resilience (Table 4).

Table 4: Institution activities and linkage to resilience against climate change effects in Arokwo

| Objectives | Activities | Targets | Outputs | Linkage to poverty eradication and climate change resilience |
|--|--|--|---|--|
| To conserve soil water and hills tops for sustainable Agriculture through soil erosion control and Agro-forestry | <p>Train farmers on contour sitting and establishing trenches</p> <p>-Use planting materials e.g. Napier grass, tree planting to protect the soil.</p> | <p>Men, youths, women, disabled people in Arokwo</p> <p>6000 metres of sited, contours planted with 2000 trees and Napier grass.</p> | <p>Farmers appreciate the knowledge and establish trenches and planting materials to protect their farms for higher production.</p> | <p>Well-conserved soil and water on farms</p> <p>Reduced landslides and soil erosion control</p> <p>Increased production of Napier grass to feed animals.</p> <p>Increased income from sale of surplus produce, firewood, timber etc.</p> <p>Improved standards of living.</p> |
| Increase production per unit area of land through establishing zero grazing units to produce organic and compost manure. | <p>Train farmers on compost making and application of organic manure.</p> <p>Establish field demonstration of compost and organic manure.</p> <p>Training in zero grazing units and animal management.</p> | <p>Men, youths, women, disabled people in Arokwo</p> | <p>Trained farmers produce compost and organic manure for their farms</p> <p>Demonstration plots on organic manure making established</p> <p>Farmers trained in crop-livestock management</p> | <p>Increased soil fertility in farms</p> <p>Increased food production and income.</p> <p>improve standard of living</p> <p>Reduce famine among community members</p> |

The tables 3 and 4 above clearly indicate the important role played by institutions in building resilience of smallholder farmers.

MEFECAP in Kenya was faced with a rapidly diminishing forest in Mt. Kenya due to logging activities, overgrazing, forest fires due to charcoal burning and arson activities from rogue villagers among others. The government put a total ban on any harvesting of forest products. However, this worsened the situation; people continued harvesting

illegally while the community members became victims due to lack of firewood, medicinal plants and other forest products. The IFRI programme in Kenya, through several awareness and capacity building sessions trained the farmers on PFM and the role they could play in sustainable forest management. They were also trained in various other technical issues such as tree seed collection, nursery establishment and management, group dynamics, leadership and team building among others. They received seeds which they were able to raise and plant in their farms to reduce over dependence on the forest. The organization acted as a link between the KFS and the local communities in addressing issues of unsustainable exploitation of forest products, frequent fires, over grazing among others. The community has since been involved in forest management and protection. As a result, they have been allowed to develop ecotourism sites such as in Lake Nkunga and King Muhuru (a huge vitex kinensis tree) famous as a hiding place for *mau mau*⁵ warriors during the fight for independence. Proceeds from the sites will be used in improving local community facilities such as health centres, schools and other infrastructure.

BOX 1: TESTIMONY FROM THE CHAIRLADY, MEFECAP

Our activities started at a time when many members had several problems related to access to forest products for their household use. We decided to form user groups based on needs of our members. Women formed firewood collectors' user groups and men joined grazers' user groups. We also formed forest protection groups to carry out patrols in the forest to stop the illegal charcoal burners and loggers.

We later approached the forester and requested if we could collaborate to monitor and manage some forest activities and in return gain access to some of the important products such as fodder, firewood and medicinal plants. He was happy to join us and allowed us access to the forest only as a group at a time and at designated points. In return we reported the offenders, managed the plantations through pruning, forest floor clearing, fire break management and forest access road clearing. 200 members from several of our groups even turned up to plant a 100 ha plot that had been abandoned after a failed Non residential farming system!!

We have since been recognized by the government through our efforts and have been assisted in carrying out various activities inside and outside the forest. The forest is now recovering and we hope to have our forest back to its original glory.

⁵ *Mau mau* is the name given to the warriors from the Kikuyu tribe in Central province in Kenya who aggressively fought colonialism to gain independence.

Although climate change effects are global, the impacts are generally site specific and are spatially and socially differentiated (Adger, 2001); therefore actions taken to adapt to climate change are local-specific; they depend on the actions taken by the individual and their socio-economic ability. Decisions to be involved in group activities are also often influenced by household interests. Decisions made at the institutional level also have direct effects at household level. Therefore, where households are excluded from institutional involvement they are consequently excluded from benefits from natural resources, thereby increasing vulnerability to the negative effects of climate change.

The most appropriate adaptation choices are therefore taken at the local, other than at the global level. In this regard therefore, rural communities enable understanding of the causes and effects of agricultural problems, and in articulating their technology, extension and development needs. Increased human and social capital facilitates community empowerment; in turn, communities actively participate in planning, implementation and evaluation of services, transforming them into clients, managers and/or owners/partners, rather than passive beneficiaries. Organizational empowerment at the community level is realized when individuals are organized in groups that are coherent, independent and sustainable. Such groups enable members to articulate their informed demands and interact with state institutions and the private sector. They are also the basis for joining/establishing higher-level organizations that could represent their interests at local government and national policy level (Friis Hansen 2005)

IFRI household studies from one Kenyan forest indicate that most households (45.8%) joined groups mainly for household benefits (Table 5). It is also worthwhile to note that the subsequent ranked reasons for joining groups such as 'increase production or access of forest products', and social aspects gaining respect from others were hinged on individual household interests since they expected to gain individually in one way or another.

Table 5: Reasons for joining groups

| Reasons for joining the group | Rank | Frequency | % frequency |
|--|------|-----------|-------------|
| To improve/gain access to benefits and improve forest management | 1 | 66 | 45.8 |

| | | | |
|---|---|----|------|
| To ensure forest protection for the community and the future | 2 | 26 | 18.1 |
| To increase production or access of forest products | 3 | 24 | 16.7 |
| Social aspects (gain respect from other members, sense of belonging, chatting with friends etc) | 4 | 21 | 14.6 |
| To gain respect from others Forced by government | 6 | 1 | 0.7 |
| Others | 7 | 6 | 4.2 |

N=150

The above argument is further validated by the model which illustrates the farm household decision making process and the role of institutions in the whole process. This model considers the household as one that maximizes a utility function over time with respect to consumption and production, including investments in productivity growth. Farming households are confronted with multiple and relatively complex choices involving both production and consumption. Based on this, the model considers household level choices regarding income strategies, land management and other choices in view of the underlying determinants of these choices. The model identifies crop production, livestock production, off farm income and institutional factors as the main factors affecting household decision making and is presented as;

$$\pi_{slm} = f(C_h, LP_h, OF_h, Is_h) \quad 1$$

Where: π_{slm} = Investments in Agricultural productivity by household H

C_h = Crop production

LP_h = Livestock production

OF_h = off farm income

Is_h = Institutional factors

The first three factors are within the farmers' decision making arena where the farmer has a high level of control on what happens in their farms. Institutional factors however; other than human capital are mainly externalities that promote or inhibit household level productivity. Some of these externalities include land tenure, market and governance structure characteristics. These are presented as;

$$Is_h = f(HC_{hpt}, T_{hpt1}, Mkt_{h1}, GV_{hpt}) \quad 2$$

Where Is_h = Institutional objective

HC_{hpt} = Human capital characteristics (education, age, and gender of household head)

T_{hpt1} = Land tenure characteristics

Mkt_{h1}=Market characteristics

GV_{hpt} = Governance structure characteristics

As illustrated in the model, institutions play a very significant role in the farmer decision making process. Participation by smallholder farmers in collective action provides or enables the attainment of Institutional objective Is_h . The human capital characteristic is endogenous but is equally important in dictating affiliation and capacities at the household level. Where the costs of attaining any of the characteristics outweigh the benefits, the farm household will seek various means of circumventing the problem. Some of these alternatives include collective action and the development of hybrid institutions to address existing gaps such as climate change effects and market deficiencies.

The model therefore highlights some of the important factors that should be addressed to ensure that institutions are adaptive enough to address household needs. This way, the farmers will realize the benefit of participating in them and be involved collectively in addressing various environmental challenges. These type of institutions should be able to i) define the type of potential and current risks in a local context and organize management groups to address the risks; ii) define local priorities to reduce these vulnerabilities, with the participation of all actors; iii) carry out reforestation programmes to increase tree cover and reduce various climatic risks iv) endeavor to work on local infrastructure such as road networks, reinforce slopes and construct gullies and buffers to counter the effects of floods and improve drainage systems; v) be vocal and lobby against unsustainable practices on the environment such as sand extraction, forest destruction, quarrying, excessive mining among others in their localities and vi) raise awareness among the community on the risks associated with climate change and provide information on local adaptation methods. The institutions should have clear linkages with higher level institutions and with their members to ensure constant sharing of knowledge, lessons and experiences.

Other important success factors for effective local institutions to also consider are: i) the identification and exploitation of a good market opportunity where necessary, ii) presence of social legitimacy and a local social structure which is supportive of the group operations; iii) a situation which permits appropriate levels of leadership without endangering cooperation; iv) supportive ideology; v) supportive institutional design that ensures inclusiveness and; vi) a supportive policy environment to ensure that their needs are addressed (Andersson 2002, 2004 and Upton 2008). This is essentially the desired scenario of local institutions whereby they are expected to have reached a high level of capacity and ability to assist their members in climate change adaptation.

CONCLUSIONS AND RECOMMENDATIONS

Climate change projections for most rural communities in East Africa include increased intensity of winds, storms, rainfall, and drought. These impacts have over time worsened soil erosion, increased risks of landslides (especially in the mountainous areas where most forests are located) and changed weather patterns and the microclimate of most areas affecting the growth of both cash and substantial crops. The severity of these impacts is most felt by rural communities whose livelihoods solely depend on agriculture and yet they are generally not well equipped to cope and adapt.

There is increased recognition that strategies should be aimed at reducing the vulnerability of local communities to climate change through the implementation of more effective and long term measures. Through local institutions, communities' vulnerability can be reduced by encouraging members to diversify livelihoods and providing technical options that are locally viable and available. They promote institutional linkages to link up community members with other civil, private, government, and non-governmental organizations to encourage more development projects and at the same time provide them with a wider choice of socio-economic activities. The linkages would also ensure that other natural resources are utilized in a diverse and sustainable manner.

Results from this study indicate that local institutions are best placed to work with farmers and to integrate agricultural practices that would be more resilient to climate change impacts and reduce climate induced risks. They also have access to information on technological packages that would best address agricultural productivity.

The cases studied suggest the necessity of vibrant local institutions that can mobilize community resilience to climate change. Understandably, local institutions vary in capacity and performance; hence the challenge that remains is moving towards the direction of hybrid institutions that are functional and empowered to be able to address local needs. Additionally, this study acknowledges the changing nature of institutions to adapt to changing situations albeit slowly. This requires concerted efforts and a supportive policy environment to facilitate these institutions enhance their adaptive capacity and in turn enable their members to attain some level of resilience against climate change effects. The cases illustrate the importance of capacity building and empowerment of local institutions as an avenue towards more resilient communities in natural resource management.

To improve resilience to climate change effects, there should be improved governance for local communities. Local organizations provide governance at the local level; although there may be levels of bias and elite capture, they remain the only channels through which representation and equitable benefits for all members including climate change programmes are possible. Market channels also need to be open and diversified and these can be done equitably through existing local institutions.

Governments and other organizations should integrate adaptation to climate change into the policies and programs of all community organizations. They should improve resilience through information, training and technologies provision to local community institutions and strengthen linkages with other community organizations for cross-pollination of ideas and to influence change. The governments should also acknowledge the role of local actors/institutions in risk mitigation strategies and utilize their indigenous knowledge to combine both modern and traditional knowledge systems for better adaptation.

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