



Norwegian University  
of Life Sciences

Master's Thesis 2016 30 ECTS  
Faculty of Social  
Department of International Environment and Development Studies

# **Local Institutions Responses to Climate Governance Policies in Adaptation to Climate Change: A Case of Small Scale Farmers in Alego Usonga-Siaya County in Kenya**

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## **Student Declaration**

I, Haron Alusiola Shilaho, declare that this thesis is a result of my own research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

**Signed:** .....

Haron Alusiola Shilaho (975947)

**Date:** \_\_\_\_\_

## **Acknowledgements**

This research paper would not have been what it is without the understanding and clear feedbacks from my supervisor Siri Eriksen, Associate Professor-Noragric. Thank you for your intellectual practical assistance, diverse policy experience and support throughout especially in later stages of writing process. Your vigor and effort made this research a success. I wish to profoundly thank him for her assistance.

I wish similarly to extent my sincere gratitude to Dr. Lutgart Lenaerts for initiating background supervision and professional inspiration guidance during writing process. Thank you again.

I thank Alego Usonga sub County Agricultural officer in charge Mr. Joshau Okumu for positive support and officially enabling me to carry out fieldwork efficiently through the knowledge of Siaya County Ministry of Agriculture on behave of Ministry of Environment and Natural resources. More thanks goes to the field Agricultural Extension Officers especially most important Chrispinia. He was all over in the field actively making rounds together throughout data collection, village linkage and support. Thank you Chrispinia once again. I also thank Chirande Caleb for field work assistance. More thanks goes to entire Siaya County Government especially Ministry of agriculture, Ministry of Environment and Natural resources and their departments for my attachment acceptance.

I finally pass my wishful thanks to my wife Irene Mesa for exemplary moral support during field work.



## **Abstract**

Alego Usonga-Siaya County in Kenya can be considered a climate change vulnerable area with larger population dependent on subsistence and rain-fed farming and other social-economic activities. Drawing on national climate policy the study explore and analyse how vulnerable small scale farmers adapted more (adaptation+) to changes in local forms of institutions. The aim of the study is to gain more insights into roles of planned national climate state use policies and responses of village level institutions in adaptation in farming. The study used a qualitative methodological approach with semi-structured and group interviews, key informants and observation as main data collection methods. The study was based on five normative principles of sustainable adaptation. Research findings indicate that the nature of devolved climate policies and local forms of institutions interaction is critical for how sustainable adaptation can be supported. The adoption of seed crops and other policy interventions can potentially contribute to the adaptation process. The policy takes a distinct outcome vulnerability approach, opposite of the contextual vulnerability approach. Attributing local vulnerability to drought and flooding and low adaptive capacity is classical outcome vulnerability.

The study demonstrates that some efforts deployed by rural farmers and government to strengthen local adaptation and adaptive capacity through traditional practices and national policy interventions cannot be isolated from usual development pathways of carbon emissions from western models of development.

The study demonstrates that interaction between policy interventions and farmer practices supports adaptation process. To strengthen adaptation, local institutions responses to climate policies determine how interventions can be applied practically. However, development pathways may actually undermine the adaptation process and potentially increase the vulnerability of some farmers.

Nevertheless, the study concludes that policy devolution to some extent can limit local forms of institution adaptation responses to climate change. Local forms of institutions shape climate policies. However, climate policies have more influence in facilitating and shaping institutional changes for sustainable adaptation pathways.

**Key words:** Adaptation+, Devolved policies, forms of institutions, Climate policy.

## **Abbreviations and Acronyms**

CCCU Climate Change Coordination Unit

CDC Centre for Disease Control

CLPKS Climate Land Potential Knowledge System

EMCA Environmental Management and Coordination Act

HIV/AIDS Human Immune Virus/ Acquired Immune-Deficiency Syndrome.

ICIPE International Centre of Insect Physiology and Ecology

KALRO Kenya Agricultural and Livestock Research Organisation

LTV Local Traditional Vegetables

NCCACC National Climate Change Activities Coordinating Committee

NEMA National Environmental Management Authority

SCIDP Siaya County's Integrated Development Plan

THVC Traditionally High Value Crops

UNICEF United Nation Children Fund



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## **CHAPTER 1: INTRODUCTION**

Climate change is a global phenomenon that will affect all regions, countries and rural areas in some way (IPCC 2007). The current climate change is likely to continue with increase in temperatures even if the increases in greenhouse gases that led to changes are curbed (IPCC 2012). The most likely consequences are shifting in rainfall patterns with many areas experiencing droughts while others flooding significantly affecting small scale farming (IPCC 2007; 2013). This limits capacity for small scale farmers' ability to cope up with escalating destructive disasters, coincidentally affecting rural livelihood and food security. It is assumed that local forms of institutions response to climate governance policy interventions play important role of shaping and shaped by policies to build adaptive capacity especially in targeting the most vulnerable and exposed rural small scale farmers. Additionally, adaptation to climate change and variability has occurred in the past and is occurring now, although empirical evidence of the effectiveness of adaptations and analytical means of interrogating them, are thin (Dovers and Hezri 2010). These are very relevant issues to explore in the context of Kenya and more needs to be studied on how climate vulnerable small scale rural farmers derive adaptive capacity and react to changes in local forms of institutions in response to climate policies at peripheral level for sustainable adaptation.

Sustainability recognizes that not all adaptation responses are necessarily benign; there are tradeoffs, potentials for negative outcomes, competing interests and different types of knowledge inherent in adaptation responses (O'Brien 2012; Eriksen et al. 2011; Eriksen & O'Brien 2007). Hence, sustainable adaptation is a process that addresses the underlying causes of climate vulnerability, poverty and ecological fragility basing on normative principles for adaptation approaches that can contribute to sustainable development (Eriksen and Marin 2015). It is considered a way of generating social transformation, or changes of the root causes of vulnerability (O'Brien 2012; Eriksen et al. 2011). Some climate change environmental shifts are potentially threatening to sustainable development paths. Others help move towards sustainable adaptation pathways, especially if the trends or events are severe enough to require significant adjustment (e.g. introduction of crop policy to more climate vulnerable areas (O'Brien 2012).

Some regions in tropics have particularly variable climates and most have acted—witness long radiations in water policy and drought policy (Dovers and Hezri 2010). Sub-Saharan Africa is viewed to be particularly vulnerable to climate change and disasters, due to changes in rainfall reducing responses of rural adaptation in farming (IPCC 2007). In Kenya the

National Disaster Management Policy, adopted in 2004, acknowledged that more than 70 percent of the natural disasters were related to extreme climate variations (Moser et al 2010). Temperatures have risen throughout the country from minimum by 0.7 – 2.0 o C and the maximum by 0.2 – 1.3 o C, depending on season and regional level with irregular and unpredictable rainfalls but when it rains, downpour is more intense (GoK 2010). Extreme, harsh weather is now a norm in Kenya (GoK 2010).

Rural *Alego Usonga* in Siaya County experience climate vulnerability context due to climate risks and hazards of droughts and flooding. Small scale rural farmers from history have adapted to some stressors and climate shocks through farming, small scale micro-economic business, and social relation activities regulated by local forms of institutions (PAI 2014). However, frequent climate variability in the area has led to scarcity of water, diseases, migration movement of some citizen to urban centre's, affected socio-economic systems of productions and increased poverty with combined effects of climate change on local farming (PAI 2014). Therefore, due to increasing climate variability's and livelihood vulnerability exposure to climate change, policy interventions were needed and this led to introduction of devolved five year climate change action plan to local Siaya County level. Policy devolution refers to delegation of services and interventions by higher authority decision makers together with governance resources to lower levels (Uphoff and Buck 2006). The action plan contains policy reforms and sustainable adaptation strategies in relation to climate change governance (GoK 2013).

Therefore, the motivation of this thesis topic is to analyse how local forms of institutions in *Alego Usonga* respond to such designed and formulated national climate policies to achieve more adaptation (adaptation+) in rural small-scale farming. This is important because climate change represents a new risk order of challenge for policy and institutional change, compared with existing variability and broader agenda of sustainable development and adaptation (Dovers and Hezri 2010); and also rural capacity to adapt can be affected by development pathways policies (IPCC 2007). Therefore, adaptation+ (plus) is a term the researcher has coined and reconstructed using an example from "REDD" (Reduced Emissions from Deforestation and Degradation). That means simply to conserve forests by not cutting down trees then REDD further coined and defined into "REDD+" (plus) an additional value to meet compensation and promote sustainable social, economic development at same time achieve emission reduction (Vatn 2005). Adaptation + in this study assimilate REDD+. This means that the local people had their own means and ways of coping up in response to climate

change risks and stressors like drought (Dovers and Hezri 2010). However, the Kenya government has introduced new climate policies in promoting adaptation to local climate change targeting vulnerable Alego Usonga sub County (GoK 2013). This research counts such introduced policy interventions in rural farming and their improved adaptive capacity as adaptation+. An additionality to already adapted small scale farming instituted in traditional farming norms, cultural seed rights, values and informal rules. “The way of life” that had been initiated by local institutional practices of adapting to climate change from history (Dovers and Hezri 2010). Due to existence of local forms of agricultural institutions in Alego Usonga from history with prediction of increased drought in the future, make the region a special relevant area of investigation when studying institutional responses to governance policies in a changing climate.

Therefore, responding to climate change is about adjusting to risks, either in reaction to or in anticipation of changes arising from changing weather and climate (Adger 2012). Local forms of institutions such as informal rules and norms are important in understanding their responses to adverse climate change risks in rural farming towards adaptation of particular farming policy and how farmers perceive climate change policies in their institutional context (Adger 2012). Local forms of institutions are embedded in farming practices, small scale farming cultural values, climate change phenomenon interpretation and perceptions which helps to explain institutional responses to governance policies for adaptation (Adger 2012). However, literature shows that local forms of institutions simultaneously maintain some degree of social coherence and as such, the study of adaptive processes in local forms of institutions in rural small scale farming settings is an important aspect of climate change research, one which often receives insufficient attention (Crane 2013). Additionally it is also sometimes difficult to differentiate policies and institution forms in terms of which one results in behavior change (Adger 2012). This is because institutions mediate transactions in human societies and are resilient and persistent (Dovers and Hezri 2010; Vatn 2005). Therefore, these are more relevant issues to explore in the context of Alego Usonga an important study area to understand how forms of institutions shape and shaped by devolved climate policies.

## **1.1. Thesis statement, Objectives, Research Questions and Outline**

### **1.1.1. Thesis statement**

Local forms of institutions response to climate vulnerability and governance policies for adaptation are vital for survival of poor rural household communities through generation of food security in small-scale subsistence farming. Local norms, informal and formal legal



rules, agricultural laws and bylaws are potential social, economic, political and environmental instruments that guide rural people on how to respond to environmental resource governance and changes of climate conditions in them (Dover and Hezri 2010). Therefore, in climate adaptation literature, research and policy on adaptation and mitigation has paid a great deal of attention to biophysical models of adjusting to risks of lives, costs of decarbonizing, costs of impacts on various sectors of economy (Adger 2012); science and technology driven adaptation (Eriksen & Marin 2015); practices and structures of governance (Adger and Tompkins 2005). However, comparatively little work has been done on local-level responses to climate change and variability, especially the local forms of institutional processes that shape them (Crane 2013).

### **1.1.2. Thesis Objectives**

With overarching climate environmental changes main objective of this study is to gain more insights into the roles of planned national climate policies and responses of village level institutions in adaptation in farming community of Alego Usonga. To meet demand of lengthy researched concept of *adaptation plus* the main research objective was narrowed down to:

#### *Specific objectives*

- i. To explore how devolved climate policies improves small scale farming adaptation to climate change in Alego Usonga.
- ii. To explore how devolved policies influence institutional changes in small scale farming in Alego Usonga.
- iii. To find out the mechanisms in which national climate policy is supported and linked for more sustainable adaptation pathways in Alego Usonga.

### **1.1.3. Research Questions**

To gain above insights, main research question guided by Eriksen and Marin (2015) normative sustainable adaptation principles is: *How have vulnerable small scale farmers adapted more to changes in local forms of institutions in response to devolved climate policies in Alego Usonga?* In order to explore more how institutional responses to devolved policies can improve adaptation to climate change and links between national and local sub county policy governance, the study was guided by three sub-research questions:

**RQ1:** What is climate policy and change in local forms of institutions?

**RQ2:** How do various small scale farmers align themselves to institutional changes for adaptation in Alego Usonga?

**RQ3:** How is national climate policy linked at Alego Usonga? And do what extent are devolved governance policies support more sustainable adaptation pathways in Alego Usonga in Kenya?

#### **1.1.4. Thesis Outline**

This thesis outlines six structured chapters in relation to climate change adaptation concepts, climate governance policies and local forms of institutions responses. This was important as the study reflected on each of them at various capacities in rural Alego Usonga Sub County presented as follows. Chapter one presents an introduction of the main concepts used in the thesis. The chapter also presents a literature review related to climate change adaptation in rural agriculture and in particularity with local forms of institutions response to devolved climate governance policies, classifications and their impact. A sustainable adaptation perspective involving five normative adaptation principles used in analysis of study findings was also reviewed. The Kenya government sustainable climate change devolved action plan with laws and reform agenda to farmers was also highlighted. Such review will inform the analysis of findings in chapter five.

Chapter two focuses on research methodology process used during the research study; a qualitative methodology associated with data collection methods of observations, various interviews processes, group discussions and key informant interviews was used. Ontological and epistemological concerns, research design, data collection methods, data analysis, challenges, limitations and ethical considerations are also presented in this chapter.

Chapter three presents the study area of interest; Alego Usonga Sub County in Siaya County and background climate vulnerability context information about Kenya, climate change risks exposures and effects. The fourth chapter focuses on qualitatively generated field study results. Chapter five focuses on intensive analysis of sustainable adaptation pathways in relation to five applied normative adaptation approaches examining how devolved national climate policies promote adaptation to climate change in farming towards development pathways with emphasis on local forms of institutions. The chapter also analyses various interpretations of climate policy, its diversities, policy integration and mechanisms that links national with local level policy processes. Local forms of institutions response to policies were also analysed and how institutions are shaped and shape policies for adaptation. Lastly, chapter six presents discussion and conclusions derived from the study and how such issues can be complemented with other studies.

## **1.2. Conceptual and theoretical perspectives**

### **1.2.1. Climate change adaptation and sustainable adaptation framework.**

#### **1.2.1.1. Climate change adaptation**

According to IPCC (2014) climate change adaptation is defined as “the process of adjusting to actual or expected climate and its effects [and] to moderate or avoid harm or exploit beneficial opportunities”. In the context of this research study however, adaptation to climate change is seen within the lens of local forms of institutions as a wide range of behavioural adjustments that households and institutions make (including practices, regulations and incentives) to mandate or facilitate changes in local farming, aimed at reducing vulnerability to climatic variability and change (Leary 1999 & Burton et al. 2002). In the context of policy governance, adaptation to climate change is seen further as the decision-making policy process and set of actions undertaken to maintain the capacity to deal with current or future predicted changes in agriculture sector (Nelson et al. 2007). Institutional changes are required that coordinate adaptation and mitigation strategies to ensure that adaptation within particular sector is achieved (Dovers and Hezri 2010).

Through institutional changes adaptive capacity of affected population individually or among social groups can be improved locally. Adaptive capacity is discussed in IPCC (2007) report (Ref 7, p. 56); as the capacity to adapt in broadly dynamic ways and is influenced by a society’s productive base, including natural and manmade capital assets, social networks and entitlements, human capital and institutions, governance, and technology. However, financial, technological, cognitive, behavioral, social, institutional forms and cultural constraints limit both the implementation and effectiveness of adaptation measures (IPCC, 2007). Institutions are discussed as determinants of adaptive capacity and at local scales ‘the expansion of social networks has been noted as an important element in developing more robust management institutions’ (IPCC, 2007 p. 728-730). Hence, specific adaptation strategies are influenced by ‘changes in local forms of institutions and national policies’ (Dovers and Hezri 2010).

The idea of human-induced climate change is not new: Colonial era Western science pondered the climate impacts of resource use and Arrhenius’ early warnings regarding carbon dioxide date from late 19th century (Dovers and Hezri 2010). Increase resource use as component to increased green house gas emissions is potential for linked global impacts of extreme events which continue to grow as the world’s economy becomes more interconnected (O’Brien 2012). The current severity of climate change impacts will determine the scope and possibilities for future adaptation to climate (Robinson and Herbert 2001). For instance,

increased drought conditions will have, *ceteris paribus*, more severe consequences for a world of about 10 billion than a world of only a few billion, especially if income equality is low, ecosystems are already stressed and governance systems are inadequate (Robinson and Herbert 2001). For example, there is robust evidence that weak institutional forms and governance weaknesses can transform extreme events into disasters (Hewitt, 1997; Pelling, 2003; Wisner et al., 2004; Ahrens and Rudolph, 2006 cited in O'Brien, 2012). This is because of acknowledged reluctance that emission reductions are unlikely to decrease at the rate and magnitude necessary to prevent current climate change that is dangerous to many (Parry et al. 2009; Schellnhuber 2009).

Climate extremes are translated into impacts by the underlying conditions of exposure and vulnerability associated with development contexts (O'Brien 2012). Thus, the new era of human-induced climate change will be *events* potentially leading to increased vulnerability rather than slow shifts in averages that put pressure on policy and local institutional capacities as well as local farming (Dovers and Hezri 2010). According to IPCC (2014) future vulnerability and risks related to climate change will vary substantially across plausible alternative development pathways (business as usual). However, the relative importance of development and climate change varies by sector, region, and time period (IPCC 2014). Therefore, adaptation to climate change is thus increasingly considered as an important remedy and essential to reduce risks and vulnerability to climate change (Eriksen 2011).

#### **1.2.1.2. Deliberate transformation and sustainable adaptation**

In this study, sustainable adaptation framework was used to analyse research findings basing on its five normative principles. Eriksen & Marin (2015) noted that sustainable adaptation is an approach to climate change adaptation that emphasizes the importance of development pathways built on strong sustainability. The approach grew out of an awareness that climate adaptation can have unintended negative effects on peoples and the environment and that there is a need to think critically about what types of adaptations are desirable (Eriksen et al. 2011; O'Brien 2007). There is a response concern that adaptation has often been operationalize in practice through changes in technology, institutions and policies (Klein et al. 2007). However, literature shows that it is also important to focus and challenge current development paths, including the social, economic and political structures that underlie many contemporary problems (Eriksen 2011). Although adaptation can potentially reduce the negative impacts of climate change, little attention has been paid to the consequences of adaptation policies and practices for sustainability (Eriksen et al. 2011). What seems to be a

successful adaptation strategy/policy to climate change may in some case undermine the social, economic and environmental objectives associated with sustainable development (Eriksen et al. 2011). As debates about sustainable development continue, questions are raised about the underlying development pathways based on fossil fuel and intensive consumption patterns that contribute to inequity, poverty and environmental problems (Adams 2009). Such development pathway does not address different personal values and interests which affect adaptation outcomes (Eriksen & Marin 2015). Hence, continued innovation in policy ideas is needed to keep creating new values (Westley 2011). Therefore, adaptation initiatives must “actively transform agricultural systems, governance, usual development paradigms, production and consumption patterns, knowledge production systems and values” (K. O'Brien 2011, p 5). Thus, adaptation is a long-term transformation of social and technical practices (Crane 2013).

However, to emerge from current trajectories of global emissions, a broader approach opens up for deliberate transformation that actively tries to influence the future – independent of climate models (K. O'Brien 2011); with similar calls for ‘strong sustainability’, which involves changing current modes of development, questioning calls for continued growth (usual pathways of development) and appealing for a less managerial approach to human–environment relations (Adams 2009). Transformation in context of climate extremes involves fundamental changes in the attributes of a system, including value systems; regulatory, legislative, and technological or biophysical systems through integration with climate change adaptation strategies and wider systems of human development (O'Brien 2012). Therefore, transformation in wider political, economic, social, and ethical systems can open or close policy space for a more resilient and sustainable form of disaster risk management (Birkland 2006 cited in O'Brien 2012). Further, according to Robinson and Herbert (2001), climate change can be made more relevant to policy by contextualizing it within sustainable development framework. How to achieve deliberate transformation and sustainable development integration in context of local institutions and climate strategies for rural sustainable livelihoods in climate vulnerable regions is a matter of concern in development practice. This is because the tendency of poor people to be highly vulnerable to climate change is often used as a justification for implementing adaptation policies; however, whether or not the proposed adaptation measures will actually assist poor groups is seldom assessed (Eriksen et al. 2011). Therefore, to assess and deal with such issues, Eriksen and Marin (2015)

formulated five normative principles for adaptations approaches that can contribute to socially and environmental sustainable development. These are:

1. Recognize the context of vulnerability including multiple stressors.
2. Acknowledge that different values and interests affect adaptation outcomes.
3. Integrate local knowledge into adaptation outcomes.
4. Consider potential feedbacks between local and global processes.
5. Empower vulnerable groups in influencing development pathways and their climate change outcomes.

The first principle emphasizes role of policy decision making organs to recognize the context for vulnerability, including multiple stressors. The principle affirms that social, economic, institutional and cultural conditions that contribute to a wider context for vulnerability needs to be understood, in order to identify direct and indirect consequences of adaptation efforts, and to be sensitive to the spatial and temporal effects of such efforts (Eriksen et al. 2011).

Second principle acknowledges differing values and interests affecting adaptation outcomes. Hence, by recognizing potential value conflicts can help to identify how adaptation responses taken by one group may affect vulnerability context of other groups (Eriksen et al. 2011). In other words the principle demands that governance processes analyse and recognize different interests and potential value conflicts up front, and identify how these may influence outcomes (Eriksen et al. 2011).

Third principle recognizes the need to integrate local knowledge into adaptation responses to achieve sustainable adaptation pathways. Since different groups and actors produce different knowledge on adaptation, which source of knowledge is recognized and used in decision making is crucial in determining which interests or development paths are prioritized and demands integration of such knowledge into local context to achieve sustainable adaptation process (Eriksen et al. 2011).

The fourth principle reflects on considering potential feedbacks between local and global processes. Therefore, for local adaptation efforts to be considered sustainable there is the need to consider the global affects for example, greenhouse gases on environment, effects on population at risks and local responses feedbacks (Eriksen et al. 2011).

The fifth principle is about empowerment of vulnerable groups in influencing development pathways and their climate change outcomes. Through empowerment, local adaptation must

be recognized as part of equal political development processes rather than focusing only on climate outcomes (Eriksen and Marin 2015).

### **1.2.2. Climate vulnerability and rural adaptive capacity.**

Environmental feedback changes in which individuals and communities belong have different capacities for anticipating, responding, adjusting to changes and vulnerability as it occurs (Edger et al 2009). Whereas climate vulnerability and rural adaptive capacity responses are considered often local, vulnerability causes – or stressors – are both local and global (Agrawal 2010; Eriksen et al. 2011). Hence, vulnerability can be considered a property of coupled interacting social environmental systems characterised by complex feedback relationships (Eriksen and Marin 2015). Therefore, lower level phenomenons are to some extent constrained and shaped by process operating at higher levels e.g. global process (Edgar et al. 2009).

Vulnerability within social and ecological systems is thus assessed in relation to specific populations and places (Cutter et al. 2003; Adger 2009). For instance, rural farming households, communities and ecosystems on which they depend are exposed and sensitive to negative impacts of economic, social and environmental climate change (Edgar et al 2009). Climate scenarios for the coming century indicate that even farming cultures and livelihoods in semiarid zones that have been organized around uncertainty and drought risk are expected to be exposed to new extremes, challenging their adaptive capacities (Crane 2013). These differences and similarities in exposures, sensitivity and rural adaptive capacity define the scope of vulnerability to social, agricultural and environmental change (Edgar et al 2009). Climate vulnerability is the state of susceptibility to harm from exposure to stresses associated with environmental and other changes and from absent of capacity to adapt (Edgar et al. 2009).

Hence, reality of vulnerability in systems and places demands considerations of multiple levels –economic, cultural, demographic and environmental changes and potential non linear “surprise” responses by susceptible populations (Edgar et al. 2009). Susceptible populations involves low status rural farmers and disadvantaged groups who suffer greatly from climate change and it bears remembering that rural famers have successfully faced threats linked to climate variability in the past (Agrawal, 2008). The threats in variability and continued increased vulnerability and risks exposure have consistently changed rural people’s capacities in ways of living and coping to unpredictable climate changes that affects farming. Agrawal & Perrin (2008) noted that given the nature of climate change hazards; droughts, flooding and

storms among others –the stresses they create for rural livelihoods will cause reduction of existing livelihood farming options and perhaps more importantly in the short to medium run will increase the volatility and unpredictability of livelihoods benefits, especially in semi arid, ecological environments. Agrawal & Perrin (2008) further argued that it is likely more fruitful for policy interventions to focus on improvements in rural adaptive capacity of disadvantaged agricultural populations (vulnerable micro-locations and groups) rather than on identifying specifically how a given group of rural poor in a particular village or district will be affected by climate change vulnerability. Like policy intervention of improved banana plantings enhances rural adaptive capacity by acting as a source of food and income from the sale of the fruit at local and national level.

However, there can be differences in vulnerability exposures at individual, household, community or social group's levels and at various scales. Climate change affects rural men, women, children and elderly, rich and poor alike. At an individual capacity among the social rural poor are also those well off in attaining better livelihood with appropriate risk reduction and adaptive strategies. Hence, to an extent they are able to overcome vulnerability exposures and this differs to individuals with low social economic status and in poverty. Agrawal (2008) affirmed that adoption of adaptation practices by specific agricultural households and communities depends on their local institutions links, social and economic endowments, networks of relationships, access to resources and power. He gave two comparative examples of the poor being more likely to migrate in response to crop failure while the rich more likely to rely on storage and exchanges.

Therefore, to strengthen the adaptive capacity and reduce vulnerability of the rural poor in farming, governments and other external actors need to strengthen and take advantage of already existing local adapted strategies that many various households use collectively or singly (Agrawal & Perrin 2008). A number of studies have been undertaken that shows resource-poor farmers and communities use a variety of coping and institutional adaptive response mechanisms to ensure food security and sustainable livelihoods in face of climate change and variability (IPCC 2007). These are facilitated and enabled by 'on-ground' actions, policy and forms of institutional mechanisms (Dovers and Hezri 2010). IPCC (2007) noted that such on ground rural adaptive capacity in farming and crop choices are based on a variety of complex causal mechanisms; not only basing on resistance to drought or disease but also on actors cultural preferences, palatability, seed storage mechanisms and capacity (Scoones et al. 2005 cited in IPCC 2007). However, IPCC (2014) postulated that understanding future



vulnerability, exposure, and institutional response capacity of interlinked human and natural systems is challenging due to the number of interacting social, economic, and cultural factors, which have been incompletely considered to date. These factors include wealth and its distribution across society, demographics, migration, access to technology and information, employment patterns, quality of adaptive responses, societal values, governance, and local institutions to resolve problems (IPCC 2014).

### **1.2.3. Policy devolution**

With regard to climate change adaptation, policy can be defined as a purposeful statement by a government expressing its recognition of a problem and stating its commitment to address a problem through specified actions (Heinrich 2010). One of the key functions of policy is to advise and direct the government and the governed on necessary actions to address identified climate change problems (Heinrich 2010).

Climate policy devolution as a transformation mechanism to climate change vulnerability involves a consultative decision making policy within people's jurisdiction with delegation or conferral of authority to decision-makers at regional, district and lower levels along with resources needed to exercise that authority through formal legal framework and self-governing privileges or resources: funds, information, personnel, etc (Uphoff and Buck 2006). Devolution seems to take place because decisions made and resource intervention policy program at national level is deemed not to be servicing the entire population adequately at municipalities, local county, local sub unites, social groups, at community to household and individual capacity levels (Bauer et al. 2011). Uphoff & Buck (2006) noted that it also could occur to create and establish efficiency in systems of reform dissemination to have an overhaul of some centralized work and simple noncomplex duties that can be done by groups, local authorities that do not demand extreme expertise, sophisticated technology or techniques and tools but only complex matters like national climate policy budgeted evaluation and facilitative support remains centrally determined. Therefore, adaptation and climate risk management are important at all levels of government and policy governance (Betsill & Bulkeley 2007).

Once policy devolution from national government has been done by relinquishing responsibilities, duties and policy initiatives to lower levels of local authorities referred to us classical form; which contents that it is time for local state government machinery to make consultative decision making policies within people's jurisdiction. Uphoff and Buck (2006) referred to "classical form" of power as a process where "local governments have vocation

comprehensive responsibility to get involved in action and represent all citizens and thus cannot single out one population group like choosing the rural poor small scale farmers and develop exclusive programs and activities for that group alone even if it constitutes the majority of the population.” This is also in line with Eriksen and Marin (2015) example that since impacts of climate change will have local variations and adaptive capacity will vary across social-political and institutional settings, a significance share of flood-risk management decision needs to take place across and at local level respectively. Ostrom (2005) also affirmed that key management decisions in resource management should be made as close as possible to the scene of events and the actors involved.

Therefore, national climate policy design, formulation is a process before devolution can take place at lower caters of local governments. In reality climate policy agenda setting, policy formulation and decision-making , implementation and evaluation are no clear-cut stages but they have multiple inter relations, fuzzy boundaries and policy makers usually handle different policies at different stages in parallel (Jann& Wegrich 2003, 81). In the ideal-type policy cycle situation, monitoring and evaluating policies at level of local government within their jurisdiction, marks the last stage of policy making resulting either in the termination or the renewal of a particular policy at that particular level (Jann & Wegrich 2003). This deals with practical local evaluation whether the intended set climate policy goals and results like emission reduction or livelihood has been achieved or has failures. Also whether the devolved policy needs additional improvement and reformulation to suit local reality or have to be done away altogether. Here, policy makers and or researchers assess the relevance, efficiency and effectiveness of a particular policy in operation at local level (Jann & Wegrich 2003).

However, governments are mainly concerned with formulating adaptation policies (e.g. in adaptation strategies), and with establishing governance agricultural structures and mechanisms that are supposed to facilitate their implementation in coordinated and knowledge-based ways (Bauer et al. 2011; Biesbroek et al. 2010).Therefore, there are warning signs suggesting that devolved agricultural resources or rather technological policy innovation (creation and implementation of new ideas and the spread of such ideas in rural areas), far from serving our needs, may indeed be driving development in directions directly opposed to sustainability (van der Leeuw 2010) and we may be “locked in” to a technological policy innovation trajectory reinforcing the current path (Westley 2011).

Therefore, the current path of policy devolution can take various processes. Uphoff & Buck (2006) identified various forms of devolution; Operationalize devolution, standard,

intermediation, philanthropic and marketization devolution. Climate policies activities can be used as an example to represent form of operationalize devolution in action at local government level. In standard devolution, extension work is done by local government units which are responsible for all agricultural programs, personnel and financing of extension services, with central government ministries and departments providing technical backstopping only (Uphoff & Buck, 2006). Furthermore, intermediation devolution is where extension work done by cooperatives as a service to their farmers as members i.e. farmers agricultural cooperatives. Philanthropic devolution deals with agriculture extension activities at local government level where it is subject to assistance, support and done by NGOs or a church organization on a pro bono basis (Uphoff & Buck, 2006). While on basis of devolved marketization according to the authors, the devolved climate agricultural extension policy work is undertaken by businesses on a for-profit basis. This could be accomplished by providing technical support on a fee-for-service basis; or by ‘bundling’ it with other commercial transactions, e.g., with credit to local farmers to improve rural farming.

#### **1.2.4. Local forms of institutions classification and impact on climate change adaptation policies**

##### **1.2.4.1. Classification**

Institutional literature reveals a variety of ways in which local forms of institutions relevant to climate change adaptation and their response to climate risks/policies can be classified including based on their formality and informality (IFAD 2003; cited in Uphoff 2006). Ostrom (1990) defines the term institution as rules in use by a set of individuals to organize recurring activities that lead to results affecting them and maybe others as well. She further noted that institutions are humanly created and can be classified as formal and informal mechanisms that shape social and individual expectations, interactions and behavior. Likewise, according to North (1990), institutions are “*rules of the game*” and not “*outcomes of the game*”. These are permanent in a society and structure human interactions during resource use. North classified institutions into two categories formal (constitutions, laws and property rights) and informal (sanctions, traditions, norms of behavior and codes of conduct or behavior). He emphasized that informal code of behaviors underlie, supplement and are perfect analogous to formal rules. The idea of coexistence between formal and informal constraints implies that on one hand there exists a continuum of undocumented customs and traditions which constraint behavior of individual and on the other hand there exist that which are documented such as constitutions, and formal laws which perform similar functions

(Letete 2011). Institutions can also usefully be classified as complexes of norms and behaviors that persist over time by serving socially valued purposes (Uphoff & Buck 2006). The norms once internalized support an underlying value. In consequence, North (1990) elaborated that above institution forms structure incentives in human exchange, whether political, social or economic spheres of life.

However, the term local institution has also been used to refer to political, economic and social organizations/private entities such as local governments, NGOs, user associations, service organizations etc (Uphoff and Buck 2006). Within these organizational frameworks of structural entities, actions of local forms of institutions like norms, formal and informal rules, laws, conventions, cultural rights and bylaws are articulated, classified and transformed. In the absence of formal rules, a dense of social network; repeated interactions; reputations and mutual knowledge lead to the development of customs, laws, trust and normative rules that constitute an informal institutional framework (Fedderke & Garlick 2010 cited in Letete 2011). Therefore, the general mediating role of institutions between people and the environment, between individuals and collectivities, and between different collectivities make them essential to adaptation efforts (Crane 2013).

#### **1.2.4.2. Impact on adaptation and climate reforms for rural livelihoods**

The introduction of livelihoods as a central concern in development planning and policy evaluation has added concreteness and urgency to government, donor and NGOs efforts to reduce poverty (Uphoff and Buck 2006). End hunger, achieve food security and improve nutrition through policy interventions targeting small household farming is at the heart of the sustainable development goals for rural livelihoods (FAO 2016). The effects of climate change on our ecosystems are already severe and widespread, and ensuring food security in the face of climate change is among the most daunting challenges facing humankind (FAO 2016). Rural local forms of institutions can play important roles in countering rural food insecurity and climate vulnerability that is so endemic in the life experiences of poor individuals and households (Uphoff and Buck 2006).

Local forms of institutions responses to reform agenda are vested in historically practiced farming and strategies used by rural populations for livelihoods. Such institutional forms are vital towards creating urgency of determining impacts of climate change on adaptation among vulnerable small scale rural farmers. The success of historically developed adaptation practices among rural poor depends crucially on nature of prevailing formal and informal rural forms of institutions (Agrawal & Perrin 2008). Formal and informal forms of institutions

can make it easier, cheaper and more profitable for people to invest in activities (agriculture) that produce more income and employment in rural areas, for their livelihoods and or for others (Uphoff and Buck 2006). Thus, the prospects of adaptation practices, depends on specific institutional arrangements -adaptation never occurs in an institutional vacuum and all adaptation practices require property rights and norms of trust are necessary to adapt to climate variability while agricultural extension forms of institutions can facilitate rural livelihoods diversification (Agrawal and Perrin 2008).

However, Cleaver (2012 p 81) further affirmed that there can be pleurisy in action between informal and formal forms of institutional engagement referred to as polycentric governance that may need harmonious integration. In other words the authors concepts of polycentric governance is often applied to understanding how small- and medium- scale institutions can be “nested” into wider governance arrangements; a concern for mainstream institutional theory in relation to adaptation to climate change (Ostrom 2010). Thus, all these institutional arrangements forms are situated within households and communities are linked, or potentially linked, having different economic, social information and other connections with distant kin, enterprises and diverse institutions within the country and often internationally (Uphoff and Buck 2006).

Therefore, examining the environmental risks that rural populations have historically faced, their cultural and institutional configuration responses to these risks that facilitate individual and collective adaptation strategies is therefore a fruitful area of inquiry and policy analysis for generating effective coordination with external reform interventions (Agrawal & Perrin 2008). Hence, devolved policy reforms are significant in vulnerability reduction to climate change impacts and food insecurity.

Effects of climate change are already impacting agriculture and food security in rural areas and will make the challenge of ending hunger and malnutrition even more difficult (FAO 2016). Hence, this may lead to loss of rural livelihoods and income. Rural local Institutions are important for addressing and mitigating factors of food insecurity and instability, dealing in particular with various aspects of climate vulnerability (Uphoff and Buck 2006). Due to increased vulnerability of rural people to climate change, reform interventions are in demand and rural local institutions mediate external reform interventions into local contexts, and articulate between local and extra-local, social and political processes through which adaptation efforts unfold (Agrawal 2008). The author further argues that even with presence of multiple local institutions, each of them will have particular impacts on adaptation

depending on their degree of connectedness, if and how they organize their response to climate hazards and their articulation with extra-local institutions and resources. External reform interventions and extra resources include finances, knowledge and information, skills training, new institutional inputs and technological support (Agrawal 2008; Uphoff and Buck 2006); and all these can be classified as climate reform measures towards achieving climate change adaptation among rural farmers to improve food security and livelihood. Hence, from this perspective institutions constitute and organize the incentive structures for household and community level adaptation responses which shape the nature of these responses (Agrawal & Perrin 2008).

### **1.3. Nature of devolution of sustainable climate policies in Kenyan context**

In Kenya, since late 1990s the Ministry of Environment and Natural Resources has assumed leadership over Kenya's climate change policy process prepared and led by same ministry; and climate activities at government level have been limited mostly to and in communication with United Nations Framework Convention on Climate Change (UNFCCC) (Moser et al 2010). Climate change was still broadly considered by politicians and government agencies as an environmental and rural issue and perceived to affect multiple sectors with National Environment Management Authority (NEMA) coordinating environmental issues (Moser et al 2010). The author also realized that there were few climate initiatives recognized by then even though other government ministries and political dimensions like former office of the prime minister and presidency leadership had taken interests and part in dialogue on climate change policy and reform agenda. Hence, political willingness and participation in dialogue led to promulgation of 2010 new Kenyan constitution. Newly devolved agenda reforms consist of climate change objectives focusing on tackling climate change disaster risks and vulnerability. With increasing climate vulnerability, there was demand for action and change thus this led to establishment of sustainable adaptation five years Kenya National Climate Change Action Plan (KNCCAP) in 2013 with an extended focus towards prosperous vision 2030.

The KNCCAP for year 2013-2017 involves national policies geared towards realisation of development pathways. This is by devolving of critical climate resilient and low carbon development paths to local county governments' levels by stipulating governance frameworks, financial structures and necessary implementation arrangements (GoK 2013). To achieve low carbon development pathways, the climate mitigation laws in the new Constitution of Kenya provides financial support and technical capacity for maintenance of at

least ten per cent tree cover on land, whilst the Kenya Vision 2030 targets call for the planting of at least 7 billion trees to address food, water and energy security. Hence, REDD+ is identified as a potential key component towards realization of the plan (GoK 2013). The Action Plan guides local and national adaptation transition in the face of climate change towards a low carbon sustainable development. For example, in 2010, the Government launched the first National Climate Change Response Strategy (NCCRS) agenda guide which aims to enhance understanding of global climate change regime and impacts of climate change in Kenya particularly in rural areas. It provides a basis for strengthening and focusing nationwide governance policy action towards climate change adaptation, mitigation and addressing climate change local vulnerability in achieving prosperous vision 2030 (GoK 2013).

The climate action policy plan guide provide objective guidance on: (i) the envisaged general legislative reform framework to be established through a Climate Change Law; (ii) the specific sectoral legislative reform amendments that will enable full implementation of KNCCAP priority actions at local levels; and (iii) provide a facilitative reform framework for development of specific actions and responses to climate change in the years ahead (towards achieving Kenya vision 2030). In the ambitious visionary plan the agriculture sector consist of climate risk assessment that shows how the integration of climate change issues into planning and implementation is taking place through policy, strategy, legal reform agricultural laws and assessment that reflect government's position on drought management and development of arid and semi-arid lands (GoK, 2013 pp 54). From same Government of Kenya (GoK) 2013, a number of climate change sustainable adaptation policy interventions in agriculture have been proposed in strategic plans of ministries and some are currently being implemented by national, local County and sub county governments, civil society and/or the private sector. These include: seasonal forecast provision to rural agricultural vulnerable communities, support for community-based adaptation strategies, rural conservation agriculture, developing climate weather indexed livestock and crop insurance schemes, climate change relevant agricultural research (like desmodium science parasitic plant research) and extension services provided by field agricultural officers, promoting heat tolerant and adaptive food crops (cassava varieties, modified maize varieties) and livestock breeds respectively, establishment of fodder banks for dry season feeding and institutionalising early warning systems. Other governance policy actions to county and sub county governments over 5 years for the

agricultural sector also include medium-term environmental adaptation outcome and proposed policy for the agriculture sector:-

- Farmers and climate adaptive farming practices supported by applied research. For example, technology focus is on continued development through research climate Change resilient inputs and strategies identify adaptation success stories and support up-scaling in relevant agro-climatic zones including Siaya.
- Policy on effective communication among farmers and from farmers to government on climate adaptive strategies for the agricultural sector (linkage between local and national government).

However, under GoK (2013 pp 56), the Agriculture Sector Development Strategy (ASDS) 2010-2020 specifically outlines the implementation of the National Climate Change Response Strategy (NCCRS), noting in part that “Climate fluctuations have a bearing on the way the environment and natural resources are managed ... and the effect has been unpredictable weather that in turn has affected agricultural activities.” Under Northern Kenya and other arid lands sub-sector the main challenge cited is high impact of drought on local communities, which causes food insecurity and contributes to increase of poverty in arid areas. Therefore, the 2010 ASDS and adaptation policy measures include prevention, tolerance, changes in land use or activities, changes of location and restoration (GoK, 2010). Proposed and adaptation policy measures in implementation process in ASDS strategy include provision of downscaled weather information and farm inputs both to county and sub county level; water harvesting e.g. building of sand dams for irrigation; protection of natural resource base (soil and water conservation techniques); promotion of economic livelihood diversification e.g. cultivation of drought-tolerant food crops such as millet and research and dissemination of superior (drought tolerant, salt-tolerant, pest and disease resistant) crops. Developing special livestock insurance schemes; breeding of animals that adapt well to climatic vagaries and regular vaccination campaigns.

Above policies are manifested through identified institutional framework from wide cross-section of stakeholder interests from public (Central and local county governments), private, academia, research and non-state actors. These institutions are seen as actors and structural entities involved in policy formulation, choosing and spearheading implementation for example, experts and academic with their scientific, professional and disciplinary perspectives. However, within the entities are institutional forms that embody a culture of continuity and dynamism within a society (Crane 2013). It is important therefore in this



research to examine how such local forms of institutions respond to such climate change policies and practically how institutionally locally oriented farmers adapt more to changes to achieve additional adaptation plus for rural livelihoods in review of applied Eriksen and Marin (2015) supportive five normative principles enabling adaptation. Thus climate policy making and governance is much also about new institution formation that is defining new rules, generate common values, interests, attitudes and new norms. The responses of such forms of local institutions to devolved climate policies may determine rural small scale farming adaptation outcome in Alego Usonga sub county-Siaya.

## **CHAPTER 2: RESEARCH METHODOLOGY**

This chapter outlines the processes used during the research and presents the following: Research methodology, ontological and epistemological considerations, research design, data collection methods and analysis. Research methodology involved a qualitative descriptive methodology which emphasized interpretive scenario associated with data collection methods of observations, interviews, group discussions and narratives. Later an outline of research design of study; a cross section and longitudinal of which the former was utilized while employing a qualitative case study approach. The chapter elaborated on data collection and data analysis methods used and also presenting ethical concerns considered by the researcher in arriving at links with informants in entire study process.

### **2.1. Research methodological approach**

Berg and Lune (2012) described qualitative research as referring “*to meanings, symbols, characteristics, concepts, definitions, metaphors and descriptions of things*”. Therefore, qualitative methodology criteria of research was employed during field work in rural Alego Usonga Siaya County to better ascertain local institutional framework, meanings, social farming arrangements, policy relations and processes or phenomenon of climate change polices in view of farmers local adaptive agricultural practices. This strategy was used as it involves in-depth understanding of social phenomenon, social structures and human experiences and has interpretive methodology associated with certain data collection methods that include observation, interviews, group discussions and narratives (Magilvy and Thomas, 2009). This is because individuals offer meanings and interpret environment phenomenon differently thus cannot be understood and studied as natural objects (or figures)>> (Bryman, 2012).

The researcher preferred to use qualitative research over quantitative approach. This is because, quantitative research strategy emphasizes quantification (use of measurements) in collection and analysis of data and that entails a deductive approach to the relationship between theory and research in which the accent is placed on testing of theory (Bryman 2012). This could have limited the researcher in getting more discursive and important conclusive relevant supporting information. Therefore, qualitative research method was importantly used as a strategy that usually emphasizes words, images, prescriptions rather than quantification in collection and analysis of data and predominantly embodies an inductive approach to the relationship between theory and research, in which emphasis is

placed on generation of theory (Bryman 2012; Berg & Lune 2012). Therefore, this study utilized qualitative strategy throughout because researcher could interpret data back and forth in linking major concepts of climate change to the roles of policies and how institutional forms are shaped and shaping reforms to generate farming reality unlike quantitative methodology that involves a linear process, hence qualitative research is a cyclical process and involves a researcher reflecting on and interpreting data throughout research process (Magilvy and Thomas, 2009). Reflecting and interpreting was possible because qualitative research methods collect and analyze data focusing on words and includes interviews and discourse analysis and is often characterized by proximity and closeness to often a small number of carefully selected respondents (Berg and Lune, 2012).

In addition, qualitative content analysis was also important as data production is flexible and considerate to local social contexts that are often characterized by close contact between researcher and study population (Berg and Lune (2012). However, quantitative methodology could have been used but due to complexity of in depth issues involved, informant farmers, climate experts and field officers were allowed to describe complex phenomenon in their own words derived from own perspective and experiences in order to achieve study main objective of gaining more insights into roles of devolved national climate policies and responses of adapted local institutions for livelihood among climate change vulnerable rural farmers in Siaya Sub County and achieve institutional adaptation+.

### **2.1.1. Ontological and epistemological consideration**

Ontological orientation is concerned with beliefs of nature and reality of the world whereas epistemological orientation is concerned with perspectives of how the world is studied through science and what is considered as acceptable knowledge (Winchester & Rofe, 2010). Qualitative research strategy adopts constructivist ontology and an interpretivist epistemological stance (Bryman, 2012). Constructionism is an ontological position that asserts that social phenomena and their meanings are continually being accomplished by social actors (socially constructed) and it implies that social phenomena and categories are not only produced through social interaction/connection but assumption that they are in constant state of revision and continuous change (Bryman, 2012).

Therefore, this study employed constructivist ontological orientation approach with assumption that socially constructed world is complex and what is considered as appropriate knowledge depends on individuals' interpretations of reality, hence the study needed an interpretivist epistemological approach (Bryman, 2008). Thus the findings herein this research

study is based on researcher's interpretation of socially constructed world phenomenon or environmental change being claimed by constructionist ontological approach. For example, the research findings were based on informants' personal interpretation of their social milieu reality concerning their locally institutionalized agricultural practices and how policies influence practices to achieve local adaptation to climate change.

## **2.2. Research design**

A research design provides framework for collection and analysis of data (Bryman, 2012). Therefore, choice of research design reflects decision about priority being given to a range of dimensions of research process with importance attached to: understanding behavior and meaning of that behavior in its specific social context; generalizing to larger groups of individuals than those actually forming part of investigation and having a temporal (that is over time) appreciation of social phenomena and their interconnections (Bryman, 2012). Hence, a case is a term that associates case study with a location such as a community or organization (Bryman, 2012). In finding out local institution response to climate governance policies in Kenya, a qualitative case study was used focusing on case of vulnerable small scale farmers in Alego Usonga sub county-Siaya.

## **2.3. Data collection methods**

### **2.3.1. Sampling approach**

Sampling research technique is where a set of individual units are drawn from some definable population and generally a small proportion of population is used to make inferences that are intended to be applied to entire population (Berg & Lune 2012). Purposive sampling a non-probability form of sampling was used in this research and which is appropriate for labor-intensive and in depth studies of few cases (Bernard 2006). In depth research requires informed informant, not just responsive respondents, that is, people who the searcher chooses on purpose, not randomly (Bernard 2006) ; or where the researcher does not seek to sample participants on a random basis. Therefore, in purposive sampling selected unites were investigated according to judgment of the researcher (Bryman 2012). Types of purposive sampling chosen and relevantly used in this research were experts, homogenous and snowball samplings.

Expert sampling is used when research needs to glean knowledge from individuals that have such specific or particular expertise and particularly useful where there is lack of empirical evidence in an area with high levels of uncertainty (Laerd, 2012). Alego Usonga is an area

with climate change uncertainty and rural people are vulnerable. Expert sampling was therefore used and involved a focus only on sampled individuals chosen with specific climate change governance knowledge and expertise on policies. Hence, climate experts' informants were identified. The second approach used was a homogeneous sample. It is chosen when research question that is being addressed is specific to characteristics of particular group of interest (Berg & Lune 2012). In other words, homogeneous sample is often chosen when the research question that is being addressed is specific to the characteristics of the particular group of interest, which is subsequently examined in detail (Laerd 2012). Thus the sample is based on knowledge and targeted population where rural farmers in Alego Usonga and local authority policy personnel were identified and information was derived. Alego Usonga consists of seven constituency regions namely; Usonga, West Alego, South Alego, Siaya Town Ship, East Alego, Central Alego and South East Alego. From each region three (3) small scale farmers were sampled and interviewed. However, groups' interviews were done according to researchers initial findings. Siaya Town Ship is a central administrative region in Siaya County and one group was sampled. This was an already formally established entity consisting of five field extension officers. In central Alego, cassava group was sampled. This was also an already established active group entity in cassava cultivar farming. The last group sampled was from South East Alego. The group was initiated and organized from among the small scale farmers attending training and regular field exhibitions.

Third approach used to generate raw data was snowball sampling. It involves building sample based on initial participants' introductions to others and follows up of one you are introduced to and after each other to the next (Bryman 2012; Bernard 2006). Snowball sampling is relevant where contact with first group will assist to establish contact with other (Bryman 2012). Therefore, snowball sampling was employed for 'key' informants (Skilled farmers) in Alego Usonga community who introduced the researcher to next farmer whom they exchanged farming idea of climate adaptable practices. Snowball was also repeatedly used to trace relevant policy staffs at national level especially in Nairobi since it was difficult to locate most potential policy makers in national ministry of environment and agriculture. Such respondents within departments had important material clues on climate governance policy formulation, intends and devolution links to climate vulnerable local population.

### **2.3.2. Interview tools: Unstructured interviews, formal and informal semi-structured interviews and observation**

Qualitative interviews may be structured or unstructured (Rubin and Rubin 2005). They may include formal and informal semi-structured interviews and Observations. Unstructured interview idea is to get people to open up and let them express themselves in their own terms and at their own pace while structured interviews involves use of interview schedule with instructions to interviewers who administer questionnaires orally (Bernard 2006). Formal interviews are reflected in written guides which are absolute must for researcher to follow it if he wants reliable comparable data while informal interviewing is characterized by total lack of structure and control but researcher remember conversations heard during the course of a day session in the field with constant typing in computer by memorizing daily sessions and developing field notes (Bernard 2006). According to Berg & Lune (2012), interviews and group discussions are a form of generated data that comprise of reconstruction of information and always involves re-telling and re-processing through verbal recounts by study participants. The author further noted that observation involves study of phenomena in natural settings.

#### **2.3.2.1. Unstructured interviews**

Unstructured interviews are based on clear plan that is kept constantly in mind, but are characterized by a minimum control over people's responses (Bernard 2006). Also the interviews go on all time throughout the research process at the research study sites and just about anywhere at homes, walking along the road, weeding a millet field and hanging out in bars or waiting for a bus (Bernard 2006). Twenty (21) unstructured individual interviews with different types of informant farmers were done in Alego Usonga especially on informants' farms, when informants were attending area plant clinics and informants visited at rural homes. However, some were interviewed at their shops or shopping centers as buyers or sales men and women due to inability to find them in their farm or homes during day time because for some, planting and weeding season had just ended. Another reason was that sales men and women reported of using such method as an adaptive process of not only depending on farm food but to supplement farm produce with shop keeping or selling part of farm produce like dried maize and beans on local market for income as a local coping mechanism. However, for those informants found at their homes it was not easy to collect a full balanced gender based sample for married couple because females chose to sit back and excuse themselves once male counterparts were present, not for fear but for husband respect to speak first and receive

a visitor according to society cultural norms thus this was a challenge which affected gender balance. Hence, due to such minimum control, out of 20 farmers 14 were male informants and 6 were women. However, once the wife is called upon she could however, easily contribute important input on local farming practices.

### **2.3.2.1. Semi-structured interviews**

Semi-structured interviewing is based on use of interview guide with written list of questions and topics to be covered in particular order and may include objective and subjective questions, main questions, probes and follow-ups (Bernard 2006; Rubin and Rubin 2005). Interview guides help to remember essential questions and to maintain a good structure throughout interviews (Berg & Lune 2012; Bryman 2008). Data generated is important as it creates an understanding into participants' values, perceptions, opinion and behaviour and meaning that they attach to them/insights or in-depth information (Berg & Lune, 2012). Therefore, semi-structured interviews work very well in projects where a researcher is dealing with high-level bureaucrats and elite members of community (Bernard 2006).

Semi structured individual interviews were held during field research work. This was with fifteen (15) informants; among them 5 from local climate Environment and natural resource management officers (NEMA); 5 interviewed informants were Extension field Agricultural officers of Siaya County within Alego Usonga catchment area and 5 climate experts. Three different interview guides were developed. First one was directed to climate experts in national government with main question, "what climate policy and change in adaptable local institutions meant". Third interview guide was directed to local County extension officers focusing on "how national and local climate governance is linked to achieve institutional adaptation+ and if whether policies were legitimate climate mechanisms in rural farming". However, semi-structured interviews and unstructured interviews were sometimes both used concurrently especially on Second interview guide which was directed to local area small scale practicing farmers and farmers focus group. Some informants had booked appointment through phone call and with central question posing "what improvement to trickle-down climate governance policies have on adapted local agricultural institutions for adaptive capacity among vulnerable people in Siaya". These were among three main research questions that informed interview guide with subsequent open ended probing questions (Berg & Lune 2012).

### **2.3.2.2. Observations**

Berg and Lune (2012) noted that observations presents chance to document and examine behavior and interactions as they occur but without being part of a study population. For observations, researchers should try and understand informants' situation as possible and establish trust with them as this has an influence on quality of data gathered (Berg & Lune 2012). During this study the researcher initiated walks in Alego as he made observations traversing rural local farm villages and farmers homes on the way. The walk through community provided key important information as observations were made such as local climate effects, local farming practices, policy in action especially cassava cultivars and farmers seen on farm weeding. The researcher attached to a field extension officer from county government was able to engage with local farmers and also gathered part of data from own observational interpretation of climate phenomenon on cultural norms and informal rules in rural set up that was uninfluenced by informants themselves. Informal interviews were done at the beginning of informants observation field work, build greater rapport and at end of each field work daily session important notes were remembered and noted down in computer on a daily basis which also counted and contributed to data analysis.

### **2.3.3. Group interviews**

In qualitative research, focus group technique is a method of interviewing that involves more than one, usually at least four interviewees, essentially it is a group interview (Bryman 2012). Focus groups are widely used to find out why people feel as they do about something or steps that people go through in making decisions (Bernard 2006). For example, why Alego Usonga local farmers changed to new norm and policy of cassava cultivar varieties over traditionally valued one. To achieve that, three semi-structured group interviews were organized. First, was *farmers group arrangements* of approximately fifteen farmers but only six members were available for interview. Informants came from different orientation background in relation to farming; meaning that they were farmers groups from different field of crop and animal husbandry affected by climate change respectively. The six accepted to be interviewed because they were attending a locally organized training and demonstration arranged by ministry of agriculture from Siaya county government to test change in eating habits as a result of devolved climate agricultural policy and laws. Second focus group was an *established cassava group* and eight members were interviewed from among twenty group members and the rest were not present. Third group had five members but this were arrangements of *formal administratively structured group* of field extension officers who



were interviewed during their every early morning Tuesday's mandatory meeting schedule according to Siaya county regulations at the county office.

During focus group interview situation, challenges were encountered. For instance, it was not possible to have privacy for lone same members interviewed. Some external members came in due to proximate friends or who knew each other were let in especially during farmer's group interview discussions but had also important contributory remarks and understanding of area climate and local norms of practicing farming for livelihoods. Moreover, focus groups take long time to arrange and it takes long to transcribe recordings that are made (Bryman 2012). However, it was possible to access three groups because they were already established and with formal advance request to county minister of agriculture in coordination with one of extension field officer the researcher was attached to; preparations and arrangements were made which eased interview work. Notes were hand written and noted down during conversation by the researcher and also got assistance from field officer in attendance.

#### **2.3.4. Key informants**

There were specialized informants selected (Climate experts); who are differentiated as people with particular competence about particular cultural domain (devolved climate policy), while key informants are people who know a lot about their culture and are for reasons of their own, willing to share all their knowledge with you (Bernard 2006). Four skill full key informant farmers were carefully selected and interviewed. In selection, skill full key informant farmers were defined as those with trained knowledge on climate policy related to farming problems, attended trainings, have long field agricultural practices for more years and have vast of different local agricultural information and norms, local informal rules on their farm like perform mixed farming; rearing cows, goats, sheep, poultry, mixed cropping and intercropping. Good key informants are people whom you can talk to easily, who understand the information you need and who are glad to give it to you or get it for you (Bernard 2006). One example of key informant was located at Alego Ngiya market village who nicknamed his farm in local Luo language DAKTEK (*living with climate is difficult*). Informant had vast of knowledge about traditional farming norms, rules on how new policy have shaped local farming and how some farmers are unable to adapt in relation to changing local climate. Local area chieftaincy and field extension officers both assisted to provide link and connection to other Key informants.

## **2.4. Coding and analysis**

In qualitative methods, data analysis includes testing ideas and ideas revised from offset of the fieldwork, which is all part of analysis (Berg & Lune 2012). Analysis is the search for patterns in data and for ideas that help explain why those patterns are there in the first place (Bernard 2006). This is possibly through operational issue centered analysis that involves a comparison of information involving different concerns and topics in relevance to research questions which enables emergence of themes (Berg & Lune 2012). Hence, daily summaries for each interview conversations were first noted down during and after field work just to keep in touch and memory of what entire research major issues were interlinked especially farmers views, perceptions and opinions of own farming norms, climate adaptation in agricultural practices and influence of climate policy instruments. Data analysis was then done derived from information collected and written down field work notes according to research topic and questions. Therefore, issue centered analysis was used to classify and structure information from data through reading and annotating primary data collected transcripts and transcribed word by word in a computer. For instance, annotating and linking types of farming norms and rules present for example community norms, informal exceptional rules respectively. Therefore, the researcher developed a coding scheme/ table and data with similar patterns with important information drawn in relation to structured themes and subthemes that led to final analysis of result and findings leading to discussion of contents of the findings.

## **2.5. Triangulation**

Triangulation is use of many multiple lines of sight in research study (Berg & Lune 2012). By combining different lines of sight methods, researchers obtain better and more substantive picture of reality; richer more complete array of symbols, theoretical concepts and a means of verifying many of these elements (Berg & Lune 2012). Triangulation of answers in this research study was achieved by interviewing different informants at various process and status of Alego Usonga community. Climate experts, local farmers, field officers and local structured organizations provided important clues that aided triangulation of given answers and ensured validity of data analyzed. Field observation through walks done by researcher viewing farming practices, crops and climate effects in Alego helped to verify information provided by climate experts and county government officials interviewed. To ensure validity of collected data for analysis, twenty interviews with local informant farmers were done which enabled cross-checking of important climate norms, informal rules in relation to

applied action roles of formal policy reforms to farming practices. Triangulation was further enabled through use of secondary literature review like review of actual policy ideas in five year action plan in relation to responses of locally arranged adapted institutions and validity availed through critical study of local traditions, historical local climate and agricultural land institutional practices. This was important as data information collected was not all supported in all areas. Some farmers' views were not similar to national climate experts for instance; farmers had views that policies of climate land potential knowledge system (CLPKS) had not well been devolved but only for well able farmers in Alego Usonga who could access it something that climate national official refuted. Thus, from all perspectives realization was that such triangulation of informants' answers using theoretical policy plan, literature reviews and information provided on both sides of interviews enabled analysis of data collected.

## **2.6. Challenges and limitations**

Informants' farmers had no clear understanding on how to define policy and differentiate it from local forms of institutions like rules or norms. Farmers referred to policy as *Jik (local language)* while *Jik* in real Luo community sense are local traditional rules and related norms which brought about confusion while responding to interview questions. However, the researcher was well fluent with local Luo and national Kiswahili languages and this enabled to differentiate JIK and norms, rules from interpretation of closely related farmers views and opinions on practices and climate change.

The study could have taken more time and have a look at entire region like initial focus was at Yala wetland region but due to political conflict over wetland resource and land issues with local area farmers, government and International US based Dominion farm majoring in rice, dairy keeping and know into sugar cane and hydroelectric power which has since been stopped. These issues were of create concern as the researcher was not allowed to tackle and interview such areas as it was not allowed to enter. The company was always concerned on what type of data the researcher came to collect; them having been informed early prior to visit. International firm has rankles with county and national government, fighting to move them out with major reason that wetland resources were for area community members. This somehow limited scope of research study as the researcher was always being suspected to be national government urgent coming to derive information about ills of the company irrespective of appropriate documentation showing that the research was for masters' student thesis. The University documents and local county permit for attachment were viewed as a mere brain wash and a cover up. However, few cases were managed to be interviewed with

help of field extension officer. It was rainy season and rainfall was common especially early afternoon hence one had to leave rural village early enough not unless the poor roads becomes impassable.

Moreover, irrespective of informed consent, during research field study informants were still concerned and had expectations on what the research was going to provide after end of study. One informant farmer asked that *“here in Alego we have many climate challenges, what are you going to provide us with to improve our living and farming? Is there anything you have brought like what other organizations do like ICIPE providing desmodium plant, World vision bringing us banana plantings and Red Cross which provide cassava?(Interview with informant farmer; 12, 08.01.2016).* This was a dilemma and challenge encountered and it was hard to convince informant farmer or farmers because most research interventions in the area come with good resources and done by international and local organization providing funds for climate change mitigation and adaptation. There are few research students received for study that farmers could understand that this is a student. This affected and limited interviews because once the researcher explains in plain how the study was not able to provide any support the observation was that level of receivership and cooperation or attention switch off immediately the researcher denounces no capability to provide anything beyond. Informants portrayed level of reluctance to give important information as some so no need. However, the informant and others were affirmed that the research did not intend to provide material necessities to improve living standards but the initiative was concerned with understanding how climate change and policy issues are introduced to better their local institutions and rural farm adaptation. Similar challenges were overcome by the researcher who was accompanied by field extension officer from the county government who is well known by local farmers, and the fact that hopefully the study was going to contribute to previous studies being done in the county, the researcher encountered less questions related to paying informants or promises.

## **2.7. Ethical consideration**

Researchers demand good ethical credentials due to greater sensitivity to ethical issues and avoid cases of alleged ethical transgression (Bryman 2012). However, ethical concerns reside only in such extreme cases but in this research intervention it was more applied in practice at a general ethical awareness in entire process as fundamental obligation of the researcher. Hence, a Universalist stance takes the view that ethical precepts should never be broken like

one should assess whether there is harm to participants, lack of informed consent, there is invasion of privacy and if deception is involved (Bryman 2012).

Prior to travelling to Alego- Siaya in Kenya, consent for this study was obtained from Siaya county Governor through his county director of Agriculture and approval was allowed to undertake research study bearing in mind ethical guidelines of doing no harm and not deceiving informants, seeking informants consent, observing privacy and maintaining confidentiality of information as addressed in ethical codes of conduct. Before each interview, the interviewees were introduced to the researcher and attached extension officer. Permission at every stage was sort for from the informants before commencement of entire interviews. Informant farmers were informed that their participation means that the researcher would like to gain more insights into how devolved national climate policies changes and shapes locally adapted institutions for livelihood among climate change vulnerable rural people in Alego-Siaya. To gain informed consent, the researcher gave the following information on how research interviews were to be conducted before starting the interviews from informants: *Individual interview and observations will be carried out and questions asked for your responses and opinions which will last approximately 20 minutes. Focus group interviews will last more than 30 minutes where necessary. Questions will concern climate change policies, linkage and their effects on local farming norms, agricultural rules and practices after which data will be collected through written down notes. Your contribution will be treated confidential and only be accessed by the student researcher, supervisor and examiner after which notes from your response shall be discarded safely and no storage of any data will be done after project completion. Informants were further informed that it was voluntary to participate in the project and can at any time choose to withdraw their consent without stating any reason.*

The extension officer accompanied the researcher and is known as a routine visitor and the researcher was also introduced just like as one of the officers in the field which made interviews easier. The presence of extension officer and his introduction of researcher did not have influence over final results of data collected as informants were set free to declare their interests voluntarily according to codes of ethical conduct and willingly to participate if they wish so for quality findings. Prior ethical information (appointment) provided in advance to every visits relieved uncertainty of influencing interview responses because informants were prepared to receive the interviewer and was therefore aware of the project intention. The officer was less involved in interview contribution but acted as a link between researcher and

community by dispatching and assisting to arrange for each interview meeting session, locating key informants, showing village direction and area terrain with no means to coerce informants as the researcher was fully aware of such concern and his presence.

## **CHAPTER 3: THE STUDY AREA**

Going by changes in local forms of institutions, there remains a large gap in knowledge about local institutions responses to climate policies in adaptation to climate change (Agrawal 2008). Climate change defines sustainable development pathways and processes necessary for adaptation. Local institutions response to climate policies will determine small scale vulnerable farmers' prospects for future adaptation. Therefore, local institutions response to devolved national climate policies in adaptation to climate change in farming may be well addressed through ethnographic research in Alego Usonga area in Kenya. Vulnerability analysis in Kenya shows that climate change has and will severely impact the country's natural (ecological); economic and social systems (Heinrich 2010). The country's economic and livelihood systems are highly dependent on natural resources, which are very sensitive to any slight changes in climatic conditions (Mogaka 2006). This makes the country very vulnerable to climate change. Due to vulnerability context associated with climate change stressors of droughts and flooding makes Alego Usonga in Kenya an important area to study.

### **3.1. Climate vulnerability context in Kenya.**

Vulnerability is defined as the extent to which a natural or social system is susceptible to sustaining damage from climate change (Kelly and Adger 2000). Several authors (O'Brien et al. 2004 and Kelly and Adger 2000) suggest of the importance of determining vulnerability so as to assist in adaptation to climate change. Vulnerability as individuals and social groups' ability to react to, cope with or adapt to external stresses placed on their livelihoods (O'Brien et al. 2004). Vulnerability studies point out close connection between, poverty, inequality and differential vulnerability. Generally, the poorest populations and marginal groups are more vulnerable and impacted by climate change in Kenya (Heinrich 2010); however, according to Eriksen et al. (2007) poor people are not equally vulnerable to climate change.

Most of Kenya's population is rural, living in scattered settlements exposed to climate risks and hazards (Mogaka 2006). Ninety percent (90%) of the population living in rural areas derives their livelihood directly from land (Heinrich 2010). To these people, land resources are the means to a livelihood determining the levels of prosperity or poverty, fulfilling social obligations, and also conferring social status and political power (Heinrich 2010). To an extent climate change has and is still going to exacerbate this situation, directly and indirectly affecting human settlement and land use (GoK 2009). Climatic catastrophes in Kenya make populations to be displaced (or decimated by death), which in turn has lead to some conflicts

in most areas of the country like Mau forest unrest in Rift Valley and vulnerability exposure in other regions (Ngecu 2005). Climate vulnerability risks exposure due to landslides caused by heavy storms have in the past claimed many lives especially in the Kenya highlands (Ngecu 2005).

Population displacement and migration from such climate disaster-prone areas (e.g. drought prone northern (Garissa County), Eastern (Machakos County) and some areas of Nyanza (Siaya County) in Kenya, and sea-level rise in the Coastal region (Mombasa County) are expected to increase (Mogaka 2006). It is expected that most of those vulnerable and on the move from rural areas abandoning their small scale agricultural activities, will head towards urban centres where assistance, income opportunities and infrastructure may be perceived to be more accessible and readily available (Heinrich 2010). According to the United States Agency for International Development (USAID), recurrent droughts in Kenya have already forced many rural residents to seek refuge in cities and towns where without any assets and little skill for urban income generation, they find life unbearable (Heinrich 2010). Difficult city life makes moving population vulnerably at risks and exposure to climate change effects.

Climate vulnerability and variability in Kenya varies from one region to another and within the same community as a product of the magnitude and frequency of hazards and of the existing vulnerability, which can have varying degrees within the country (Heinrich 2010). First, vulnerability assessment has covered gender disparities, where it has been argued that in many parts of Kenya, women constitute the population most vulnerable to climate change and climate variability due to certain inequitable conditions and situations (vulnerability factors) that place them at risk (WEDO 2007). Empirical evidence shows that they suffer a greater impact in a disaster or emergency (Enarson 2000). Second, economic losses have a disproportionate effect on economically vulnerable population, children, women and men in Kenya. Nevertheless, there can be a differential effect on the old, children, men and women as a consequence of their social roles, inequalities in the access to and control of resources, and their low participation in decision-making (Enarson 2000). However, women and their young children are more at risks during climate change disasters in Kenya (Ngecu 2006). For example, changes in the workload suggest that disasters increase women's responsibilities in the domestic scene, in many paid and unpaid workplaces in the formal and informal sectors and in the community during the stages of preparation and mitigation (pre disaster), as well as in the reconstruction stage (post-disaster)>> (Enarson 2000). Since women move along with their young children they are also affected and infected. The children are vulnerable to risks



exposure of malarial like in western part of Kenya, malnutrition due to poor dieting and vulnerable to other communicable diseases like cholera outbreak due to flooding (Yanda 2006; cited in Heinrich 2010). In the post disaster stage there may also be high levels of violence both sexual with vulnerability of acquiring diseases against women by their counterpart men. However, violence and aggression can also occur among women but at minimal level (Heinrich 2010) Further, men frequently emigrate in search of work during a post-disaster stage, leaving a gross part of the processes of response and reconstruction in women's hands (WEDO 2007).

Moreover, climate change vulnerability related to serious droughts has occurred in the last four consecutive years 2007-2010 and continue to expand (GoK 2010). This has effects on river volumes as major rivers and lakes show severe reduced volumes during droughts contributing to the constant shrinkage of the lakes such as lake Baringo in rift valley (Johansson and Svensson 2002); rivers like Yala in Siaya County and many seasonal ones completely dry up (GoK 2010). Kenya is a water-scarce country and the natural endowment of renewable freshwater are low and water resources are unevenly distributed in both time and space thus climate change has worsened this already precarious situation into droughts with consequent crop failures (GoK 2010). Climate vulnerability due to serious droughts has reduced production of staple food crops such as maize, major crops such as tea, sugarcane and wheat. For instance, consequent crop failures in 2009 placed an estimated 10 million Kenyans or one fourth of the entire population at risk of hunger and starvation (Yanda 2006). Furthermore, in 2011, maize production in Eastern Province (Machakos County) dropped by 8% due to a poor harvest caused by early cessation of the 2011 short rains, attributed to changing climatic conditions (FAO 2014). Due to such climate changes in Kenya, small scale farmers are therefore highly vulnerable (Mogaka 2006). Already the unpredictability of varying climate changes in droughts and severe flooding affects Kenya's year to-year productivity causing substantial problems for poor subsistence farmers during unusually dry or wet seasons (Heinrich 2010).

During droughts there are dwindling energy resources such as drying biomass, suboptimal electricity production capacity (AFREPREN 2009). Increased flood episodes with detrimental impacts on the physical infrastructure (roads, telecommunication, railways, ports) and on social settings (e.g. mudslides and submergence of homes) >>(Ngecu 1999).

### **3.2. Climate change variability in kenya**

Kenya covers a total area of 582,650 square kilometers sharing borders with other East Africa countries including Tanzania, Ethiopia, Uganda, Somalia and South Sudan with Indian Ocean to the south East.

Kenya is facing one of the highest annual population growth rates in the world, estimated at 2.3 % per year by 2000 (World Bank 2000); and keeps on increasing to 2.5% annually according to latest 2009 census (GoK 2009). The population is estimated to be around 44 million according to 2009 national census with majority living in rural areas and working in agriculture and involved in other socio-economic activities (GoK 2009). Climate variability and increased climate-induced migration has seen vulnerable population move from drought prone areas due to dry spells towards rainfall areas increasing pressure on already overstretched productive land (Ngecu 1999; GoK 2010).

The country has humid and warm climate with temperatures relatively being high (dry spells) even during the rainy season (Mogaka 2006). Dry spells have various definitions and according to Grundstein and Bentley (2001) defined three types of dry spells. An agricultural dry spell is considered a short-term precipitation shortage or period of high evapotranspiration that could lead to soil moisture deficit while a large decrease in precipitation for a prolonged period of time over a large region constituted a meteorological dry spell. The authors considered a dry period of longer duration than a meteorological dry spell that can affect surface hydrologic processes such as stream flow; a hydrologic drought (Grundstein and Bentley 2001). Changing and variation in hydrological processes and droughts in Kenya is a frequent phenomenon (NEMA 2005). There is increased variability of rainfall year to year (Mogaka 2006). A general positive trend (more rains) during September to February with severe flooding at Coastal and Western Nyanza areas followed by general decline in main rainfall season of March-May with severe droughts at North Eastern and Eastern regions (GoK 2010).

### **3.3. Climate change governance and institutions**

Before the new constitution with reform agenda consisting of laws, legislations and formal rules, there has been existing environmental policy framework to govern climate change problems in Kenya. The 2008 drafted National Environmental Policy (NEP) has tried to address climate change issues. The NEP treated climate change and disaster management as an emerging environmental issue and states that the government will adopt two approaches in

combating climate change – mitigation and adaptation (Heinrich 2010). The policy recognizes that many of the natural disasters in Kenya are climate related, e.g. floods, drought, occasional landslides, increased disease episodes, etc, and that the socio- economic impact of these disasters cut across the key sectors of the economy, with agricultural production, industrial processing, manufacturing, tourism, infrastructure and public health being the most impacted (Heinrich 2010). However, the environmental governance policies were not sufficient in tackling climate change concerns in Kenya which demanded formulation of totally a new policy to be more responsive and comprehensive (GoK 2010). Heinrich (2010) noted that the policy by then cannot be said to have strong provisions on climate change adaptation and mitigation. The other environmental policies were equally weak -- the energy policy, the forest policy, all lean towards environmental management, yet climate change is a concern that is beyond environmental management (Heinrich 2010).

However, by 2010 substantial number of structural institutions in Kenya had interests in dealing more with climate change issues. These include Government ministries and institutions such as the Ministry of Environment and Mineral Resources, Ministry of Forestry and Wildlife, international Non-Governmental Organisations (NGOs), United Nations (UN) and related bodies; regional NGOs and corporations; and Community Based Organisations; development partners; the private sector; civil society organisations; and research and academic institutions. But the efforts of these organisations towards addressing climate change have so far not been coordinated, leading to among others, duplication of efforts (Heinrich 2010).

This also goes a long with local forms of institutions for climate change governance enacted in Environmental Management and Coordination act (EMCA)>>(NEMA 2005). The EMCA partly consisted of linked climate strategy related to agriculture, livestock, water, energy, food, land, wildlife, forest, industry, trade, arid and semi arid lands as well as disaster risks management (Heinrich 2010). Climate strategy mandate therefore established that local institutional forms that were in place like national environmental institutional law (EMCA) formed in 1999 consisting of provisions to address and govern climate change affairs were also still inadequate (GoK 2010). Dedication and sufficient funding was needed to oversee adequate design and formulation of adaptation laws, rules and implementation of climate reforms in new climate change agricultural laws to be enacted in new constitution (GoK 2010). The National Climate Change Activities Coordinating Committee (NCCACC) continued to perform its advisory reform capacity found at the office of the president which

worked closely with the former office of the prime minister (GoK 2010). By late 2010 new climate laws were formalized in the new current constitution and devolved to all the 48 County government levels (GoK 2013). Climate Change Coordination Unit (CCCU) remained at former Office of Prime Minister and continued to provide high-level political support to climate change activities. The CCCU received additional support from Kenya climate change secretariat at the ministry of environment (GoK 2013). The two committees (CCCU and Secretariat) adhere to new 2010 constitution as an institution in following the climate change farming norms and legal rules of climate governance especially on agricultural and forest conservation laws and policies. This is aimed at Kenya’s Vision 2030 with purpose to enhance and transform smallholder agriculture productivity (FAO 2014).



*Figure 1: Map of Kenya showing location of Siaya County in Red. Source: commons.wikimedia.org*

### **3.4. Siaya county**

This section describes the vulnerability context in the case study area reflecting on socio-economic trends, recent changes and crises including climatic events, how people manage climatic variability, and then on to the relevant formal and informal institutions especially in Alego Usonga area of interest. The section begins with describing climate vulnerability context in face of climate change exacerbated by development pathways initiated by NGOs.

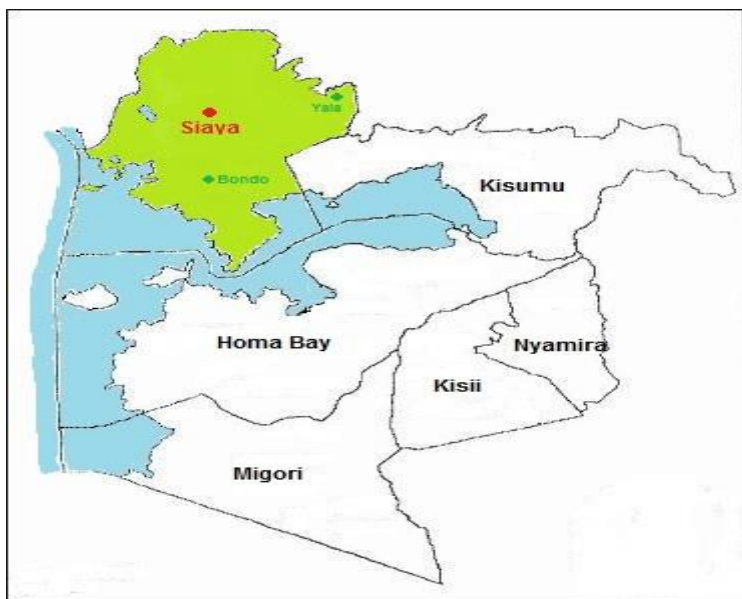


Figure 2: Map of Siaya County with Yellow Green areas. Blue regions indicate “Lake Victoria”. Source: commons.wikimedia.org

### 3.4.1. Climate vulnerability context in Siaya County

Vulnerability context in the case of Siaya County (*where Alego Usonga the largest sub county is located*) is likely and largely exacerbated by climate change effects of droughts and flooding and partly by development pathways projects and programmes that sometimes are sustainable while others unsustainable for the future climate change. On prospect of projects related to climate change adaptation interventions on one hand expose small holder farmers to climate risks while others with benefits and successes aiming at adaptation to climate change.

According to Thompson (2015) the long-term strategies developed in Siaya County have not, in their views succeeded in building resilience for farmers, now or for the future. In the authors opinion these approaches build intrinsic vulnerability into Siaya farmers’ futures. This vulnerability comes from approaches that include: First, create dependence on external inputs that are too costly for farmers and bring along other environmental problems or soil quality issues (e.g. subsidies that create dependence, soil degradation by imbalanced use of nutrients and potential health impacts (Beebe 2013). Second, the projects create vulnerability by small scale farmers relying on and utilising resources that are unsustainable, and do not address predicted environmental changes (e.g. use of drinking water for irrigation, expansion of rice cultivation and irrigation plans in a water-limited location (Thompson 2015). One example of a project that may have improved some areas of the lives of villagers, but has not improved food security or resilience to climate change, is the Millennium Villages Project (MVP) in Sauri in Yala (Thompson 2015). The project successes are by providing free subsidised

chemical fertilisers and hybrid seeds to farmers in initial stages. However, subsidies were phased out and loans were offered by MVP to farmers to buy fertilisers at market prices. Thompson (2015) observed that in 2014, 50% of MVP households were buying fertilisers at market prices without MVP subsidies and this were costly for small scale farmers. The author further noted that with subsidies yields of maize increased in some areas to 3 tonnes per hectare however, in later years after phase out farmers were vulnerable to drought effects of climate change on already poor quality soils affecting yields. Crop yield dropped as farmers were less likely to apply the unsubsidised fertilizers (Thompson 2015). The provision of improved seed that is adapted to local conditions was restricted to maize varieties and seeds of other types of crop were not provided by the programe. This affected the context in which farmers were exposed to climate effects when no other seeds but restriction to use varieties which are not necessary available. According to Thompson (2015) MVP's in Siaya will unfortunately not have a very significant long-term positive effect. The prevailing strategy seems very risky for resource poor farmers, particularly in times of uncertainty under the current changing climatic conditions in the region (Thompson 2015).

The areas Sauri, Alego Usonga and among others were previously targeted as vulnerably hunger hot spots, with documented disease burdens like cassava mosaic, tomatoes white moths and where the biophysical conditions would allow replication or spread to other areas of Siaya County (Thompson 2015). The FAO-funded Rice Irrigation Project in Siaya County both cases, albeit well-intended, could bring more vulnerability to those farming communities when they are faced with changes and uncertainty be it climatic or economic (Beebe 2013). Although the growing of high value vegetables can be a successful strategy in building diversity in incomes, Green Peace Organisation experience during farmer visits was that when cultivated as a large scale monoculture this brings vulnerability to disease and, therefore, crop failure in the wetland region of Yala Swamp (Thompson 2015).

In Siaya County introduced reliance on a monoculture that is particularly water-dependent and therefore vulnerable to fluctuating rainfall patterns is, most viewed not building resilience in the local agriculture system (Titonell 2013). On one hand this increases in income for families over the short-term, on other hand may not increase long-term resilience and nutritional security in future conditions of climate change (Titonell 2013).

Moreover, targeted malaria fighting efforts, education, agriculture and poverty have also been significant but the question remains on how these achievements will be maintained after organisation leaves and whether the prospect of climate vulnerability is likely to increase in

the future due to lack of efficient support and facilitative capacity from local government (Titonell 2013).

### **3.4.2. Economic activities and agricultural livelihoods in context of climate change.**

Local climate in Siaya County is characterized mainly as semi-humid to semi-arid region with average rainfall between 800 – 1000 mm, which comes in bimodal pattern and increasingly erratic leading to flooding (FAO 2014). Despite rainfall variability (frequency and quantity), the total amount received per annum is sufficient for crop production provided land users make good use of traditional rainwater harvesting practices before preceding dry seasons emerges (FAO 2014). In good land use systems farmers are encouraged manually to water small farms using watering cans observed as a sustainable practice as compared with other forms of irrigations like surface irrigation under gravity (Thompson 2015).

Moreover, local people have involved in economic small scale business activities like shop keeping (FAO 2014). However, economic activities in the county are affected by inflation in prices of basic goods in entire country like cooking oil, gasoline and sugar alters price volatility (Minot 2010). In addition, the county still is in early progress of attaining development in terms of providing most of the social amenities required for survival. Due to rapid population growth, Siaya County performs below national average on most socio-economic indicators to support rural people (PAI 2014). The county scores a 0.46 on Human Development Index (HDI) which is below national average of 0.56; a composite measure of development that combines indicators of life expectancy, educational attainment and income (PAI 2014).

Unemployment is an issue of concern in Siaya County and this has facilitated exodus of able-bodied men to secure jobs in economically well urban areas (Roncoli 2010). Due to poverty and lack of services, unemployment is a challenge in Siaya County, especially among the youth and majority of population are employed mainly in agricultural activities and fishing as common source of livelihood, with limited opportunities in commercial ventures and public service (PAI 2014).

The majority of local people are dependent on rural subsistence farming after which the harvested crops are consumed at household level and the surplus sold on local market, however some are involved in small scale cash crops farming like pyrethrum flower, cotton fishing along the shores of lake Victoria and local lake Kanyaboli in Alego (Minot 2010). There exist small scale firms that utilize locally available raw materials in their production

process. However, the County has no major processing and manufacturing industries and the major cotton industry broke down and has never recovered (GoK 2015). This could exacerbate climate vulnerability context to climate change. Meanwhile there are other supportive firms which include; rice processing, sugar cane juggaries, bakeries and jua-kali industries but even these are not sufficient enough to serve the 800, 000 and above population in need (GoK 2015). Therefore, there is some great potential in industrial development in the County due to the availability of raw materials such as fish, sand, mangoes, skins/hides and underlying rocks (GoK 2015).

Agricultural activities are heavily affected as local staple food crops prices are lower than before caused by instability of national and global market which reduce sales of farm produce driving vulnerability context in parts of Siaya County (Minot 2010). Therefore, climate change and decline in market sales services have had negative impact on agricultural activities. In PAI (2014), it was noted that the combined effects of climate change and unstable market in falling food prices from agricultural production are increasing food insecurity in Siaya County. This is because Siaya County local farming systems are characterized by very small landholding size (an average of 0.5 to 1ha-low economy of scale), low external fertilizer input use which has lead to low land productivity due to declining in soil fertility and also partly as a result of climate change (Roncoli 2010). This is also further attributed to the County being characterized by having moderate to low fertile soils (mainly ferrasols with underlying plinthite ‘murrum’) with poor water retention, which can support crop production if provided with nutrient support like fertilizers (FAO 2014).

### **3.4.3. Local inhabitant population**

Siaya County is located in former Nyanza Province in southwest part of Kenya, along and bordering shores of Lake Victoria. Siaya County is home to 833,760 people with population projected to grow to 965,103 by 2017 largely as a result of low methods of contraceptive use hence high fertility which is currently 5.5 children per woman, compared to a national average of 4.6 children per woman (PAI 2014). The study was therefore conducted in *Alego Usonga Sub County* with a population of 187, 243 and covers sq.km (approx) 623.50. Alego sub County is within Siaya County (figure 2) in Kenya (figure 1).



### 3.5 Alego Usonga Sub County

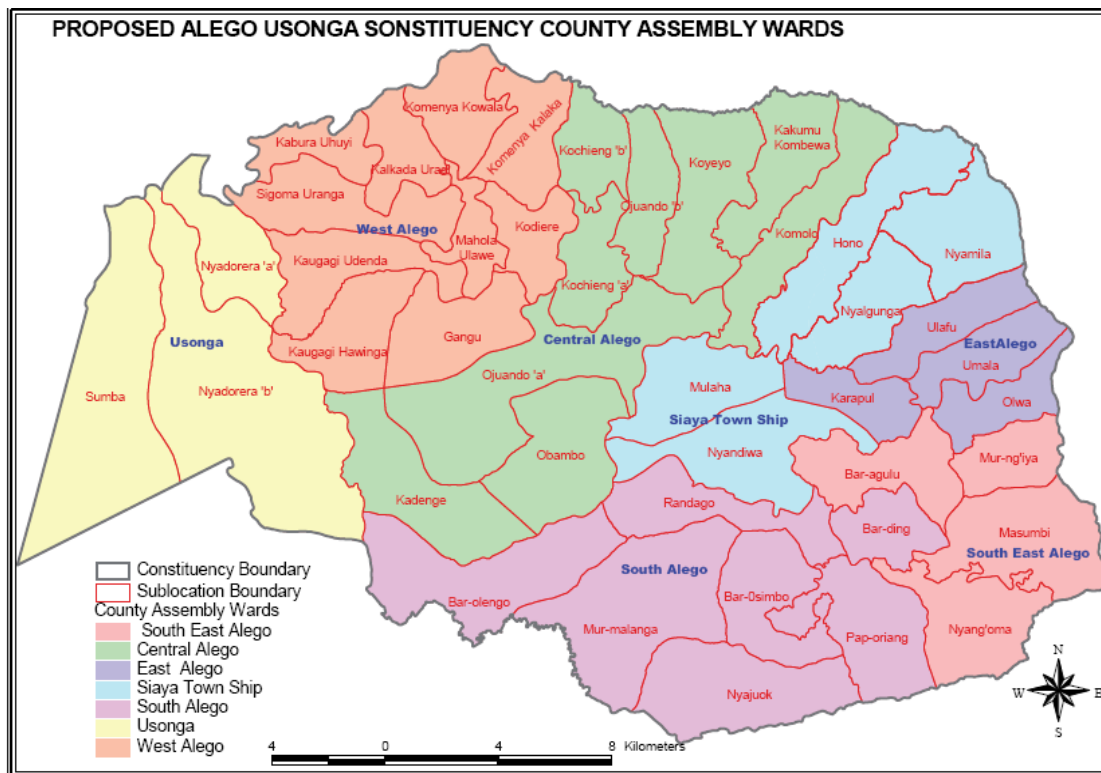


Figure 3: Map showing Alego Sub County Source: softkenya.com

#### 3.5.1 Local Luo cultural Norms and institutionalized practices

Farming activities are institutionalized in local culture in Luo ethnic group in Alego Usonga. The local institutions are vested in household norms, informal rules and cultural practices routinely followed and occasionally when farming seasons emerge. Some institutions are community recognised like marital affair institutions locally governing pride hood relationship arrangements. Climate change has impacted on how such local institutions respond. Climate vulnerability is thus exacerbated by prevalence of diseases, low house hold farm production due to financial crisis and cultural clan lineage relocation.

The study was thus contacted in Alego Usonga Sub County (figure 3) rural areas located on north-eastern shoreline of Lake Victoria in Siaya. In main study sites, most people belonged to Luo ethnic group. The local Alego Usonga Luo culture is both patrilineal and patrilocal (Lee-Smith 1997). Inheritance of property, i.e. land thus follows the male lineage and customary laws prohibit Luo women from owning land in their own right, instead Luo women can only apply their labor to their husband's or father's land (Lee-Smith 1997). Under customary laws the woman has the role and responsibility of cultivating vegetables, crops, poultry keeping, rearing of sheep and small heads of goats. Moreover, upon marriage Luo

women must relocate and live with family of the husband and potentially his other wives, since polygamy is allowed, provided that the husband can afford to provide basic needs (Gunga, 2009; Lee-Smith 1997). Local institution forms like customary laws, cultural norms and informal rules provide more recognition of men. Consequently, all power and wealth in a Luo community lies in the hands of men and this in turn delineates both gendered rights and responsibilities via the institution of marriage and cultural practices of bride wealth and widow inheritance (Lee-Smith 1997; Rocheleau et al. 1996).

However, clan lineage household cultural institutional survival is hampered by devastating wide spread impacts of HIV/AIDS pandemic incidences which changes food production systems in Alego Usonga (FAO 2014). This is particularly evident in Kenya where the prevalence is high around 15 percent of the population in Alego or even higher have HIV/AIDS disease (Gabrielsson 2012). This is especially more among widowed and divorced women in Alego Usonga, with many families left traumatized and in financial crisis in addition to loss of household labour (Gabrielsson 2012). Due to the pandemic disease, widowed women and lone mothers in Alego Siaya, their informal institutions based on trust and mutual agreement in cultural clan lineage enable them to pool labour and income buffers by diversifying farm and non-farm incomes, while experimenting with new climate policy crops and business ventures to cope up with local climate change and income for survival (Andersson and Gabrielsson 2012).

Farming across Sub Saharan Africa (SSA) where *Alego Siaya-Kenya* is found is centred on the family norms build on and are determined by everyday rights and responsibilities of individuals within a household (Eriksen and Marin 2015). According to FAO (2016) loss of livelihoods are some of emerging gradual problems associated with climate change. The organisation recommend that action is urgently needed now in order to allow enough time to build resilience into agricultural production systems. Therefore, local forms of institutions can aid in reducing vulnerabilities and building resilience, reduce the overall negative impacts on production, livelihoods, food security and nutrition (FAO 2016). There are some ways in which rural local institutions can provide 'safety nets' to mitigate climate change consequences of food security, for example norms providing access to common property like land for farming in times of distress (Uphoff and Buck 2006). Thus local forms of institutions enhance farming activities that produce value-added and also income or other benefits that make people's lives more satisfactory and food secure giving rise to rural livelihood (Uphoff and Buck 2006).

Crane (2013) noted that high poverty rates and fragile ecologies create a situation where farmers are highly sensitive to even relatively small decreases in rainfall and these factors combine to create high vulnerability to drought and associated food insecurity.

### **3.5.2. Climate effects on agricultural institutional practices and governance**

Climate change has effects on local population. Persistent droughts and flooding especially in Lower Nzioa region of Alego Usonga has affected livelihoods, cause illness like cholera outbreaks, social and economic activities, caused environmental damage and agricultural production. The institutional responses and support are therefore strengthened locally through governance mechanisms by projects developed and other measures from local authority in Alego Usonga in Siaya County.

Helping and supporting local social economies through creating local market for harvested sales (SRCF 2009). There are varieties of locally grown crops for sale. The main food crops include; maize, sorghum, millet, beans, cowpeas, cassava, sweet potatoes, groundnuts and finger millets while the main cash crop include, rice, sugar cane and groundnuts (GoK 2015). Some of the emerging crops provided by the projects for commercial purpose in Alego Usonga Sub County for improving livelihoods include: irrigated rice, chili, passion fruits and grain amaranth (GoK 2015).

Already scarce resources such as fisheries and farmland in Alego Usonga must be subdivided among more people, resulting in overexploitation and conflict (PAI 2014). Hence, due to subdivision the issue of conflict between customary local institutional land rights and agricultural land tenure rights (tenure institutional rights) arose. The conflict is commonly along the river Yala zone due to presence of Dominion firm an American Company majoring in large scale rice farming, dairy production and know into electricity. The Hydropower project and plan has since been stopped by County government. Land encroachment by the firm has potentially led to aggression and conflict between local authority and the international firm; with the locals feeling marginalized from their traditionally held land (PAI 2014). The firm has been awarded certified tenure by national government and the local county government demand to have a total overhaul and control of the Yala Wetland ecosystem for local inhabitants' livelihoods (PAI 2014). However, there are reported local political vested interests (PAI 2014). Thus Siaya County's Integrated Development Plan (CIDP) identifies local population and political dynamics, environmental degradation, and climate change as key development challenges, issues that need to be linked in national and county governance policies and programs to ensure that projects that address them are

implemented jointly at Alego sub county level (PAI 2014). The devolved systems of policy governance had to solve such concerns.

However, there are scenarios where vulnerability context could also be curbed through projects and local government support but these services are not sufficient enough to deal with climate change vulnerability context in entire Alego Usonga. Due to frequent climate change, the local County government Authority together with NGOS (for example Siaya Region Community Foundation an indigenous autonomous development organisation and Norwegian RED CROSS-Kenya with cassava cultivar programme among others) have initiated projects aiming at strengthening the population institutional and governance structures. This is through effectively, sustainably and beneficially restoring and conserving the health of local forests, agriculture, environmental pollution, sanitation affecting health with frequency of illness (SRCF 2009). Helping and supporting local social economies through institutional mechanisms to change behaviour and attitude in production systems and environment for prosperity and development (GoK 2015). Also is to ensure protection of Luanda Rabolo-Ahuya-Wuoroya Lower River Nzoia ecosystems in which local population derive water, fishing, and traditional vegetables to adapt to climate change (GoK 2015). These resources and among others are important for household economy and livelihood as they are also sold in the six major local markets within Siaya County namely Ukwala, Ugunja, Segal, Wagai, Yala and Madiany markets (GoK 2015). This is done to address twin problems of inadequate management and institutional capacity at local level to respond to climate change shocks and improve livelihood systems in agriculture and local environment for poverty reduction (SRCF 2009). The local authority and NGOS build institutional capacity through equipping, facilitation and providing required proficiency in farming to the beneficiary groups for sustainable development paths (GoK 2015). This is through providing farm input like fertilizers, food crop seedlings, livestock like improved quality goats, sheep to inbreed with local ones and also offers local production of honey through bee hive projects (FAO 2014).

In developing community livelihood improvement and adaptation to climate change especially from emerging striga weed which affect maize production and sorghum, the process revolves around operationalizing sustainable mechanisms in farming and conservation by instituting market oriented production of local fruits, trees and fish using existing local institutional ideas (SRCF 2009). This is so as to ensure more adaptation to climate change through income generation (GoK 2015). This is also done to curb down local adaptation activities by small scale farmers which are damaging to the environment by causing pollution

problems occasioned by destruction of local trees for charcoal, timber and firewood for sale on market (PAI 2014). This also aims at salvaging drying local springs and water streams due to prolonged incidences of climate change drought and also occasioned by increasing vulnerability from flash floods runoff from denuded grounds in some parts of Alego Usonga (SRCF 2009). Water body streams and local springs are important for small scale sustainable agricultural production and drinking clean safe water can eliminated rampant diseases exposures occurring due to poor sanitation like diarrhea and cholera outbreaks a common illness in Lower Nzoia (FAO 2014). The national policy concern initiated in five year action plan was to harmonise climate change and adaptation processes, national, county and sub county government laws and bylaws with regards to agricultural development and food production, land issues and environmental conservation.



Figure 4: New Striga weed (purple flowers) in a plot of maize affecting crop. Striga emerges as a result of changes in local climate change. Source: ICIPE, 2015



Figure 5: *Desmodium ramosissimum*, a strategy shown here controlling striga weed in a plot of sorghum, is highly drought tolerant. *Desmodium* is one example of devolved seed policy in national climate change action plan. Source: ICIPE, 2015.

### **3.5.3. Vulnerability to weather conditions and adaptation to local climate change.**

Livelihoods in Alego Usonga is mainly relied on small-scale household farming, however rural households have other social and economic means of survival through local linkage. The activities are both affected by climate change.

Livelihood of the rural population most often partly depends on institutionalized rain-fed small-scale farming practices that are highly vulnerable to environmental effects of climate change (droughts and flooding). It is observed that although droughts spanning years have devastating effects, smallholder vulnerable farmers attempt adaptive practices of crop production perhaps especially in the first two seasons (Kosgei 2008). In case of recurrent dry spells, Alego Usonga farmers sometimes adapt by investing each season in land preparation, inputs and other agronomic practices as they await for coming seasonal rains but once rains fall they do not somehow realize (adequate) yields to off-set the costs irrespective of the adaptive strategies put in place (Grundstein and Bentley 2001). This is because uneven seasonal distribution of rainfall exposes farm crops to intra-seasonal dry and drought spells which causes a range of mild to severe soil moisture deficits that consequently lead to yield loss or even complete crop failure (Ngigi et al. 2006). Severity of dry climate effects and drought spells on crop performance will depend on local farmer's adaptive ways with respect to crop growth stages, their duration and antecedent soil moisture conditions (Twomlow and Bruneau 2000). Source of livelihood can also be generated from small scale business ventures. In Siaya County there are 103 trading centres most of which are in Alego Usonga where local population venture into small business exchanges and sales for income to reimburse on what was lost after flooding or crop loss due to short rains followed by prolonged drought (GoK 2015). Market sales and services includes shoes made locally from car tires, shaving of hair, small scale kiosk for shop keeping, motorcycle passage services done by employed young youths, sale of traditional handcrafts made from papyrus reeds found along lake Kanyaboli. Livestock sales and exchange of goats for sheep or vice versa are also done. Sales of local vegetables like tomatoes, onions and kales while fruits grown in the region are; mangoes, pawpaw, bananas, oranges and watermelon are also sold locally (FAO 2014). However, vulnerability context to climate change may be precipitated by under developed markets due to poor infrastructural support namely: few or no market center

buildings; poor road networks leading to rural areas and poor access to water (GoK 2015). This situation is a major setback in growth of trade and investment (GoK 2015).

Moreover, there are also other financial economic activities that may improve local population livelihoods but encounter some challenges which can increase climate vulnerability to an extent due to lack of money to meet other social amenities. Local people could get involved into economic financial sector however, strings attached to lending and other factors makes area residence shy off banking sector. High interest rates offered by the corporate local financial institutions and their tight conditionality's coupled with the resulting negative attitude of resident communities, loans uptake has generally remained very low and particularly Alego Usonga the largest among six sub county in Siaya County (GoK 2015). This may have impact on vulnerability exposure to local climate change. However, there exist other sources of credits in rural areas such as table banking groups commonly known in Kiswahili as "chamas" (organized groups) which locally form an important source of credit governed by local informal norms and informal rules regularizing the group's activities (GoK 2015). But one has to meet also certain conditions instituted in the informal rules. Like the amount of money one has to contribute as fixed fee to be recognized and become a member will determine the position and level of borrowing from the chama (GoK 2015). This limits some local members from joining the local arrangement due to lack of contributory money.

Adaptive timing; Alego Usonga farmers being in semi-arid region with less rainfall also most often use adaptive local institutionalized knowledge of timeliness about local climate variations in weather patterns to plant their crops. Timeliness in planting in rain fed cropping systems has been cited as an important factor that could provide a buffer against poor crop performance in semiarid environments (Twomlow and Bruneau 2000). Alego Usonga farming is vulnerable to climate change due to availability of short showers of rainfall; and Raes (2004) observed that in many parts of sub-humid to semi-arid the rainy season begins with some light showers followed by dry spells that can cause poor crop emergence or desiccate a young crop. Local farmers in Alego tend to loss their crops especially when dry spells of drought extent beyond the predicted timeline for crop adaptation, hence farmers demand favorable crop growth conditions at all stages for successful germination and good initial timeline establishment is vital to resource-poor farmers (Ngigi 2006). Therefore, most farmers in Alego Usonga do not think of replanting again; because replanting is a non-justified added cost on already incurred expenses during land preparation, purchase of seed, fertilizer, sowing and it is often met with a lot of constraint (Kosgei 2008). Thus, it is important to note that



there is emerging difficulties on local farmers in monitoring climate variability and drought stressors but as long as there is predictability of imminent rainfall, the adaptive practice of identifying appropriate time to sow seed crops is still the most likely strategy to improve chances of good yields as well as alleviating unnecessary costs of re-sowing in rural areas. This is because the process of timelines are less costly and local information is available than waiting for meteorological interventions.

In addition, rapid population immigration and displacement in Alego Usonga due to vulnerability to local flooding places enormous pressure on natural and environmental resources such as fisheries, forests, water, and land (PAI 2014). Flooding in lower Nzoia region of Alego Usonga has displaced local farmers and population. The vulnerable displaced Luo local farmers have less adaptive capacity as opposed to those who settled in Alego Usonga early years of life on land areas that were initially presumed unproductive (PAI 2014). The early settlers developed and adopted adaptation strategies to climate changes in agricultural practices of growing major local crops like sorghum, millet, maize (cones) through use of important traditional institutional knowledge (*interview with Agricultural Field Extension Officer informant 9, 23.12.2015*). Therefore, individual local inhabitant farmers had developed adaptive strategies of practicing mixed farming. Their counterpart neighbors and migratory in-coming Luhya tribes through intermarriage links had and have to adapt to such new changes that some of other individual relatives or local Luo inhabitant population had developed capacity to adapt (*Interview with informant Agricultural field extension officer 3, 08.12.2015*). Therefore it may be important to note that rain-fed agriculture may be a well-adapted agricultural system but people may still be vulnerable in many ways because with frequent local climate variations crop failure may still occur.

Therefore, formulation of Kenya 2010 constitutions containing important climate change legislations with devolved five year policy framework for implementation by Siaya county government was to influence changes to meet more sustainable adaptation in farming. It is from this position that this research sort to gain more important insights into how climate policies influence changes in local norms, rules and informal cultural rights towards climate change adaptation in farming in Alego Usonga-Siaya County.





## **CHAPTER 4: RESULTS**

The results reported in this chapter are informants' views, opinions, interpretations and perceptions concerning local forms of institutions response to climate governance policies in adaptation to climate change. Climate experts, National Environmental Management Agency (NEMA) officials in Siaya County, their counterpart agricultural field extension officers and small scale practicing farmers were interviewed.

### **4.0. Climate policy, its adaptation strategies, local institutions and agricultural practices**

#### **4.1. Climate policies as climate change governance guidelines**

Majority of informants interviewed among climate experts from national government in Nairobi acknowledged that climate policies are guidelines towards climate interventions. Majority of climate experts further reported that such governance guidelines assists stakeholders like farmers, organizations and private entities all implementing different interventions. Among NEMA officials interviewed in Alego Usonga, a few informants said that climate policies are means of sensitization and level of awareness creation about climate. While the rest of NEMA informants unanimously agreed that from their experience in the field such policies reflects substantial change in human behavior towards environment and weather variations. An example of behavior change mentioned by one of NEMA informant is that climate policies promote consumption change in eating habits. Once asked to elaborate on what behaviour change means; the informant expressed that this changing in eating habits could be as a result of introduced climate change governance policies shifting from growing old variety crops to substituting with new variety policy to indirectly evade effects of climate related risks like hunger among small scale farmers in Alego Usonga (Interview with Siaya environmental management officer 5, 5.12.2015).

According to field extension officer interpretation, climate policies are tools moving towards software technology a transfer of knowledge away from traditional farming experiences. Once this statement is linked to farmers' views, farmers reported support and adoption of new seed policies knowledge. An extension officer reported policies are good in which information transfer is done. While other officers noted that initially majority of farmers did not now climate change causes damage to crops which affected yields because of lack of adequate climate knowledge (Interview with officer, 10, 9.12.2015). A climate expert informant further verified that *"climate policy was the way to establish; build on local peoples initiatives and*

*create local and national climate safety needs through enlightenment to escape climate risks” (Interview with climate expert informant 3, 02.12.2015. A field extension officer informant further noted that adopted climate policies are measures that have increased value addition in food yield production in which farmers are taught many different ways on how to take care of vulnerable crops to improve on rural livelihoods. One of climate expert interviewed stated “climate policies are positive contributing tool towards improving economic human livelihoods and food security development” (Interview with informant 13, 12.01.2016).*

One of Agricultural extension officer interviewed summarized that; *devolved policies “ are good but most farmers don’t like areas where they are given tasks, them not being able to understand that they are being helped. They don’t like involving agriculture with many policies. Many want ready money where they plant today and tomorrow they are harvesting. This is a change from usual agriculture activities I know. However, some farmers are grateful” (Interview with Officer 1, 24.12.2015).*

However, it is most important to note that, majority of climate expert referred to a policy as a local institution because it has some local rules in it. According to their views, policy cannot stand alone as an entity and become operational or implemented without a rule or part of the law to support and make it workable. They noted that without a binding mechanism which is in most cases maybe a bylaw in place and attached to a particular farming climate policy then the policy is weak to support climate vulnerable small scale farmers. One of climate expert asserted that “it is important to coin climate policy as local institution in relation to strengthening it”. The Climate expert further extensively defended and described the assertions that; *“this maybe one of minor reason why we don’t have tangible binding global climate governance ideals about implementing reduction in emissions (reference to Kyoto protocol) or avoiding use of coal or why local farmers deny to adopt new policy measures because the society has not internalized the policy but were it for local institutions which are well known like informal norms that reflect on right and appropriate behaviour which are internalized by every community then our modern society would let climate policy operate as norm and policy would work for itself as an internalized norm” (Interview with climate expert informant 11, 06.01.2016).*

#### **4.2. Policy strategies for local coping and adaptation**

Farmers responded to whether devolved policy instruments improve on their local coping and adaptation to local climate change. Majority of informants small scale famers reported that to

improve on local farming they resorted to evade drought by planting early maturity food crops advocated for in devolved climate policy by Siaya County ministry of agriculture; Soya introduced with new rice varieties have short maturity than old maize variety. Devolved climate policy interventions are in action in Alego Usonga and observed by informants farmers as promoting adaptable, palatable and viable crops (viable crops at farmers' disposal). Example, addible cassava food types MM series and MH series which mature at 8-9 months. A few informants' famers further reported that to evade risk exposure fertilizer subsidy policy is applicable, *"we use little available fertilizer supply from ministry to speed crop maturity"* (Interview with focus group 2, 04.12.2015). Whereas to overcome water shortages, policy of supplied supper drums for water harvesting and watering cane is sometimes provided. However, majority of farmers could improvise drums and watering cane from local metal wastes and use them for small scale irrigation.

At one point farmers reported experience of climate related risks which comes with climate change like new weeds (*striga weed*:-*"Kayonga"* in local language) but introduced government policy of use of supplied desmodium plant on farm controls *"Kayonga"*. This improves on quality of harvested crop. Farmers reported that *Kayonga* weed feeds on roots of maize plant denying it of nutrients. Farmers explained that desmodium plant is planted in between maize lines and acts as a nitrogen fixer. Similarly, farmers reported climate adaptable desmodium plant is used to cover top soil (act as cover crop) hence not affected by strong heat.

### **4.3. Climate policy integration and linkage**

All informants (Field Extension Officers) interviewed and few NEMA officers reported various processes they use to bring together adopted climate policy and incorporate with local institutions among vulnerable farmers in Alego Usonga-Siaya County. The following were mechanisms that were categorized as *"local climate policy linkage and integration"*:

#### **4.3.1. Climate land potential knowledge system (CLPKS)**

All informants' field extension officers reported use of CLPKS to integrate new policies with local values. This mechanism entails technology devolved through Siaya extension officers during their field work in community follow up. A farmer is taught how to access climate knowledge through smart/cell phones derived from ministries of environment and agriculture from central government. Information is about; that intended particular agricultural area, type of seeds to use in that particular soil, techniques of planting new crops, diseases common,

area rainfall, environmental temperatures and type of farming required for adaptation. Cell phone codes are provided and advised how to enter and access information. Informant officers noted that this helps to link devolved climate policies and help some farmers to add, integrate agricultural values and skills to already in existence in rural farming.

#### **4.3.2. Locally institutionalized capacity building workshops (ICBW)**

All informant officers also reported that they organize farmers' agricultural community workshops where climate policy teachings and knowledge transfer is done. Through such social arrangements, farmers are taught how to use manure and mulch through coordination by extension officers who deliver information in conjunction with local NGOs.

#### **4.3.3. Locally institutionalized cassava groups**

Interviewed field extension officers noted that they also use farmers' cassava groups to incorporate national governance policies ideas, measures and link with other small scale local farmers in the area. Extension officers also added that they use cassava institutionalized group to inform and encourage on additional adaptive capacity measures (adapt+) of bee keeping for honey harvesting and sales, bricks making during rainy seasons for sale to supplement on what is lost from the farm during drought period.

#### **4.3.4. Use of plant health clinics**

All informant officers explained that they use scheduled plant clinics situated in different parts of Alego Usonga on market days to deliver devolved climate governance policy message and programme to integrate with local knowledge at farmers' level. This is where farmers are advised to come in with affected crops, diseases diagnosed by extension officers and information sent back to Nairobi for analysis. Moreover, experience sharing and is a means where farmers get a chance to hold authorities in dialogue and discussion of challenges, voice their important farming concerns and local climate change challenges to responsible field extension officers.

#### **4.3.5. Local administrative chiefs' arrangements/Barazas**

Local chiefs meetings are utilized to bring together small scale farmers with climate policy integration into local farming. Informants reported that they seek to attend weekly schedule meeting sessions.

#### **4.3.6. Local exhibition/field aids institutions**

All informant officers were in agreement and reported that organized events of field visits are done weekly on one successful skilled farmers plot and other small scale farmers in the

immediate area come and learn from the plot. Additional adaptable climate policy ideas, knowledge and livestock/crop experiences are exchanged among small scale farmers.

#### **4.3.7. Local trainings**

Few interviewed environmental extension officers (NEMA) gave informed ideas that they organize trainings at the local county hotels in partnership with local organizations. A number of grouped farmers are chosen trained on new soil policy, water conservation and effects of climate change.

#### **4.3.8. Use of “Climate Women”**

Informant field extension officers were interviewed in a gathering during office meeting in morning before field work and widely acknowledged that they use local women referred to as “climate women” to integrate devolved climate policies and local agricultural practices, majority of who are most of the time are found in their homes tilling their lands and caring after crops. Informants said that in Alego Usonga, women are also experienced with local knowledge and potential land tillage candidates who spearhead climate policy integration within rural and at household level for sustainable adaptation and livelihood. Officers noted further that women do small scale farming and due to their proximity to land and with good relation with other women in social gatherings like locally institutionalized funeral arrangements and marital dowry involvements are vital in policy disseminations for subsistence agriculture and local institutions integration.

### **4.4. Local Institutions**

#### **4.4.1. Interpretation of local forms of institutions: views**

Interviewed climate experts informants reported that local institutions are legitimate instruments which assist in climate change management, routine intervention and implementation. However, small scale local farmers said that local institutions are rules that intervene and stimulate political determination with ultimate goal and commitment of improving local farmers’ livelihoods. Majority of field extension officers, few climate experts and together with farmers agreed that local institutions are climate norms which have local power towards reinforcing and facilitating adequate adoption of climate reforms and laws. Therefore, local institutions in form of adapted farmers norms and informal rules act as a key link between authority and climate vulnerable local farmers. Informant also noted that local farming institutions give direction in relation to climate farming values and they condition change. Furthermore, informant field officers and small scale farmers observed that local

farming norms are traditions that assist in local farm grievances among climate vulnerable farmers. In addition, government laws are operational measures that regenerate and empower local farmers' informal rules in order to withstand drought effects. Hence, local farming norms, cultural rules and Siaya County bylaws are therefore complementary builders of devolved local climate programs.

#### **4.4.2. Actions of local forms of institutions: how they shape and shaped by devolved reforms for adaptation.**

Majority of field officers informants reported that on one hand, local institutions in form of local informal traditional knowledge are strong and has effects and shapes climate reforms. On other hand, a key informant in Norwegian REDD Cross reported that climate reforms cause behaviour change in norms, cultural values and rules of farming. Rural farmers reported changing to new varieties as a norm; the right thing and appropriate action to do in climate vulnerable region. Climate expert further interpreted that new seedling, crops and disseminated climate knowledge has enabled change in people's and farmers' attitudes, values and local norms so that they prefer to change adaptations. Here farmers get a feeling of climate penalties from not following the norm or formalized climate rules like informant farmers reported losing the old variety to drought and going at a loss due to climate effects. Informant field officers reported that such newly adopted local institutions shapes and improves on local adaptation.

Extension officer informed that, *farmers' local institutionalized traditional rules, cultural values and norms are substituted with climate technology and research.* A complain widely shared by some of interviewed farmers. For example, informant extension officer noted that local traditional norms, *cultural values* and "*local seed rights*" of local traditional seed bank keeps changing with climate change interventions to fight drought related consequences like hunger and food insecurity with improved seed bank quality. Farmers reported that their right to traditional farming is diminishing and are *tied to right* to change towards new seeds, crops and general agricultural laws and rules of farm inputs that are mostly not supplied for free. While another expert informant claimed that there is establishment of new local institutionalized farmers' social arrangements for example cassava farmers group in which adaptable new knowledge, skills and farming rules are introduced and practiced.

#### 4.4.3. Cassava group institutional forms of governance.

##### *Cassava local rules and informal norms of practice in Alego Usonga Sub County*

The group consists of approximately 20 local community members with five hectares land or more they hold. Each group member is given or has a quarter hectare of cultivars from the five hectares. Initially some group members existed more than 10 years ago since 2005 before introduction of cassava but by then only majoring in sorghum, sweet potatoes, other merry go round money activities and amarantha local vegetables but now into cassava cultivation. They have local binding rules which help members to mediate and organize interactions of rotational cassava cultivars distribution to each next proximate member. After previous member of the group has been given cuttings he or she has responsibility as a norm/ the right thing to do to make sure the next harvest cuttings go to immediate next member. However, it is a rule that they harvest together as group members. Every day they sub divided work among themselves like those to perform sun drying of cassava harvest on alternating hours of the day and week, those to do planting, those to prepare garden. There is group patron who observes, coordinate and reinforce rules, Siaya county bylaws and daily routine norms followed and who to do sales including written records. The patron keeps daily summary records. The woman patron summarized that “With this reform, climate change should not be viewed as a negative phenomenon, is not a problem, it is a responsibility, blessing with food and money at the door” (Interview with cassava farmers group 1, 29.12.2015).

Majority of informants’ farmers reported also that some of devolved formal rules have changed local institutional farming pattern, local simple farm rules and local norms for example, have introduced new methods, skills and technology like improved “*methods of land tillage*”. “*Formal agricultural rules*” and “*rules for land clearing*” contained in devolved reform have improved on local institutions farming methods and *local informal rules* like planting crops in line than spreading seeds and then plowing through the field as it was being done under *traditional norms* and *informal land preparation rules*. The formal rules have no formal legal third party to reinforce but through Siaya Sub county Alego extension officers who only provide climate adaptation advice about formal farming. Hence, environmental risks caused by climate change penalize farmers; if farmers don’t follow climate adopted new norms instituted in the devolved policy, general laws like simple binding rules on fertilizer application on their farm, they get poor harvest or low yields as a result. A one of Key



informant farmers nicknamed his farm in Luo “*DAKTEK*” translated as –“*Living with climate is difficult*” summarized: “*just plant at a small scale plot and produces pumper harvest. Some of our Jik (local informal rules and norms) of farming do not compound to local variations in changing climate; they make us suffer of food and hunger pains because of lack of money. Planting at a small area and in lines using a measuring robe (for lining) has increased yield and is advantageous as it demands less labour power hence saves on expenses. Initially, we planted at larger area but with little harvest due to frequent drought effects*” (Interview with informant farmer daktek 12, 08.01.2016).

Potential adopted local institutional values are also reflected in farmers’ individual norm of changing to tractor mechanisation as per County bylaws from local traditions or norms of using hoe (*Jembe*) or *ox-plough*. However, low income small scale unable local farmers reported still proceeding with adaptable local traditional norms of farming. First, majority reported employing “*shamba boys*” -*young energetic rural garden boys* five per group or more for cheap small loan pay on a daily service per head and play roles of planting, weeding and land clearing. Land clearing is guided by local institution land preparation that involves following *traditionally institutionalized norms* of burning bush waste remains within garden and *community farm rules* of guarding along fence line holding branches of tree leaves to protect fire from entering neighbor’s crop land. Not unless if fire trace passes then the aggrieved person is compensated for damage according to “*mutual informal farm rule agreement*” (*less agree idea/scenario*) or if it fails (due to less compensation, denial to pay) then referred to local area chiefs and follow through institutional agricultural law process. Boys groups each have own local institutional simple rules for organization and sharing different farming activities. Second, informants small scale farmers also reported local institutions in form of “*individual farm rules*” and “*routinely followed garden norms*” in which adults (men and women) and sometimes aged children have to go weeding crops every day with “*exception farm operational rule*” from working on Sunday and school days for children. Rural farmers reported of “*mandatory individual plan rules*” for fertilizer use on the farm because soils are different in fertility from every region of Alego Sub County. In addition, there were local institutions in form of “*farmers’ social arrangements*” which spearhead farming activities. Such arrangements are made with rules. Incentives in form of cash are provided for those farmers and officers who attend. A number of grouped farmers are chosen. Choosing of local farmers groupings has local rules and enshrined within county government ministry of agriculture inform of bylaws which are followed. “*Farmers group*

*rules*” choosing is done in a way that is with disparities from different field of crop farming like consists of various farmers involved in mixture of cassava, cereal farmers, rice and legume farmers.

#### **4.5. Adaptive agricultural practices among small scale farmers**

All interviewed local informant small scale farmers and Key informant farmers mentioned that varying weather patterns without adequate warning has changed normal way of practicing farming and house life adaptation. A climate vulnerable farmer developed house life adaptive mechanism and stated that *less harvested maize is know not for sale, stored for future use because maize is vulnerable to hot weather but for new cassava in plenty is mend for sale because it grows even in try weather* (Interview with climate vulnerable informant farmer10, 05.01.2016). Majority of Informants farmers reported that local farming values improves on sustainable agriculture practices e.g. improves soil fertility and small household farming options by use of local firewood ash. Moreover, some Key informant farmers and majority of small scale farmers reported that they store harvested food crop seeds (cow peas, beans e.t.c) mixed with ash for future planting as the best local seed preservative agricultural practice to protect product from being invested by red and black weevils’. An interview with agricultural field extension officer quoted reporting that *“We encourage cultural practices and values towards use of kitchen firewood ash, mulching and animal droppings locally available, which improves crop maturity and evades late climate adverse effects of drought”* (Interview with Informant 11, 31.12.2015). Local a few interviewed farmers reported use of fresh green and decomposed manure from tithonia shrub (*genus Tithonia (Aster-aceae)*) known in local Luo language “Akech Akecha” which limits excessive use of nitrogenous fertilizers on farm. Contains organic nitrogen hence improves soil fertility.

There was also high informant report of improved local adaptation like more encouragement and continued supply of Traditionally High Value Crops (THVC-seedlings). Also known as *“orphan crops-(OC)”* (sweet potatoes, non poisonous traditional cassava, green grams, cowpeas, finger millet, pearl millet and open pollinate maize) through awareness creation to climate affected small scale farmers. OC are resistant, adaptable to drought and harvested for several seasons. They are called OC because they were abandoned crops by farmers and seen as value less but are important as they are locally found and cheap that improves on food availability for sustainable rural livelihood. Similarly, informant Officers reported promotion of improved Local Traditional Vegetables (LTV) adaptable to climate- *murenda (murere)*,

spider weed (*akeyo*), Cow peas (*kunde*) beans and *Osuka*. Such vegetables are reported utilizing less water for adaptation during drought hardship.

Informant field extension officers reported important sustainable adaptable climate agricultural practices by advising farmers to perform dry season feeding of livestock by use of harvested maize stalks and remains to feed Zebu local cows, goats, sheep and donkeys which are later sold on local market for family income and local meat production which promote local sustainable living. Adaptation practiced technique is used where outside and around small garden, a farmer plant deep rooted *Nepia* grass used for roof thatching and as livestock fodder in dry seasons.

Farmers are taught sustainable adaptable agriculture through engineering department of Siaya County about minimum tillage/ less disturbance of soil but informant officers reported that despite advice, rural farmers still continue to plough as they are dearly used to their traditional valued customary habits and land tillage system. Farmers also practice pesticides, boma manure application (farm yard manure), and mulching especially for tomato crops and small scale adaptable farming continues; *“sometimes government advice during plant clinics, workshops and crop seminars we use some herbicides to apply along and around farm to kill weeds that comes with excess rains”* (Interview with focus group farmers informants 2, 18.12.2015). Whereas majority of informants in wetland region reported a practice of land terracing which has enhanced and prevented wetland water logging hence enriching soil fertility. However, due to more water logging and experience in water logged hardship, farmers in such areas said that they have partially changed their part of land from normal farming of food crops like maize and sorghum to new initiative of distributed rice just to boost on adaptive capacity and improve on their rural livelihood.



## **CHAPTER 5: ANALYSIS OF INTERACTION BETWEEN POLICY INTERVENTIONS AND FARMER PRACTICES**

This chapter analyses interactions between climate policy interventions and farmer practices in Alego Usonga. A case of small scale farmers was analysed. Devolved policy interventions have had effects on farming practices and shaped local forms of institutions for adaptation. In this chapter, generated data will be described using research questions and theoretical perspective as guidance. The aim is to ascertain local institutions responses to climate policy interventions. The chapter is structured into three sections. First section begins with analysis of normative sustainable adaptation principles and institutional transformation. The relevancy of applied approaches in area of study is also examined. Second section includes a conclusive analysis of policy diversity, integration and local forms of institutions response to climate governance policies. The section is sub divided into several sub-sections. The chapter ends with an analysis of sustainable agriculture practices. The chapter section focus specifically on how sustainable practices shape local responses to climate shocks and stressors in Alego Usonga.

### **5.1. Principles of sustainable adaptation pathways and institutional transformation**

Five normative principles of sustainable adaptation were examined. In this section I illustrate why these principles have been operationalized for my analysis of Alego Usonga case.

#### **5.1.1. Studying sustainable adaptation in Alego Usonga: why the principles as part of the analysis.**

Sustainable adaptation principles are part of understanding how Alego Usonga famers adapt to climate change. The principles are important guidelines that can help policy makers and implementers to ensure future sustainable adaptation. The principles clearly focus on development pathways especially how adaptation outcome to climate change can be determined. Through this analysis, the idea was to use the principles to bring forward how adaptive capacity can be arrived at by considering the approach taken by national government in implementing climate policies in Alego Usonga. And also to see how sustainable adaptation principles can be applied from abstract academic sphere to real live practical sphere through small scale farming.

#### **5.1.2. Analytical framework for applied principles**

**Principle 1: understanding vulnerability context including multiple stressors.**

Crane (2013) noted that many farmers are vulnerable to climate variability and they also have a large degree of uncertainty about what any given year will be. Vulnerability to climate change in the case of Alego Usonga is related to climate stressors of droughts and flooding. Majority of interviewed extension officers attributed vulnerability to lack of information about extreme local weather events. For example, a few officers described that before introduction of climate policy small scale farmers lacked adequate knowledge about effects of climate change on crops (Interview with Extension Agriculture Officer 9, 09.12.2015). Other interviewed field extension officers noted that through seed policy delivery of information and knowledge was possible. This shows that in initial stages majority of farmers could plant their crops having inefficient understanding about changing climate.

Therefore, the national government seemingly understood the vulnerability facing small scale farmers in Alego Usonga. Hence, the national government so the need to devolve new climate policies with information to affected Alego Usonga Sub County. Such means of delivering information include through climate land potential knowledge system (CLPKS). Through CLPKS a means involving use of mobile phones, some small scale farmers could easily access and know the local area climate conditions, methods for planting and ideas about new seed policy.

Vulnerability is further exacerbated by emerging striga weed in the study area. Through their experience, majority of small scale farmers face challenges of striga weed. Therefore, the weed is a new climate stressor in Alego Usonga. The national government acknowledging vulnerability the farmers are exposed to has introduced desmodium plant as a control policy strategy. Food crops can therefore be planted and thrive well. The desmodium acts as mulch covering top soil ensuring water retention. The water is therefore available to food crops during periods of droughts. This can be categorized as an additional adaptation strategy towards adaptation + (plus). The strategy has transformed some areas in farming practices partly enhancing more sustainable adaptation pathways.

### **Principle 2: Differing values and interests affecting adaptation outcomes**

The principle reflects on values and interests instituted in devolved climate policies by policy makers from national government and how such values differ from interests that climate vulnerable small scale farmers have in Alego Usonga Sub County.

One of the field extension officers reported that “most farmers in *Alego Usonga* don’t like areas where they are given tasks” (Interview with informant 11, 23.12.2015). This reflects

different interests in thoughts held by an individual or a group of farmers on how they understand and perceive devolved climate policies from national level to Siaya County and later *Alego Usonga* sub count. On one hand, a few farmers' interests seemingly were to adopt crops with early maturity, plant, harvest and sale for income. On the other hand, majority of other farmers' interests were concerned about how to evade hunger through creation of food security. Therefore, the value of fast maturity crops have made some farmers interested in adopting climate policy. The national government decided to devolve climate policies with interest and possibility of ensuring that adaptation process is successful.

Therefore, interests and values among some small scale farmers sometimes can constrain devolved climate policy interventions. However, to the contrary such values and interests can also support climate interventions for realization of adaptation outcomes. The conflict in values and interests between devolved climate policy and farmers values could be due to deliberate development pathways prioritized by the national government with aim of transforming livelihoods without factoring in interests of some farmers'. This may negatively affect adaptation outcomes. The above is in line with Vatn (2005) assertions that choices and preferences support and constrain specific values. Interests and values subjectively influence the adaptations that are prioritized (O'Brien K. L. 2009). According to Adger (2009 b) such social values and individual characteristics may likewise act as deep-seated barriers to sustainable adaptation. However, to the contrary Eriksen and Marin (2015) noted that values and interests can vary within local communities with the government pathways being embraced by some particular members. Some *Alego Usonga* farmers embrace national government development policy pathways.

In *Alego Usonga* some small scale farmers' interests of planting their own stored seeds has been affected. They are therefore tied to right to new seeds provided by the national government through *Alego Usonga* sub county authority, facilitated by field extension officers. A few farmers' rights to local seeds have been limited by devolved climate policy. The policies emphasize drought tolerant value of new seeds over the local seeds. Some farmers' value of planting their local seeds is diminishing by changing to new seed policy. For example, interviewed local informant farmer in *Alego-Siaya* narrated that *"we are left with no option but tied to right towards new crops together with new agricultural laws and formal rules governing local farming"* (Interview with informant small scale farmer 2, 23.12.2015). From history, local farmers are used to planting seeds harvested and stored locally. However, with new seed policy intervention and actions their local traditional seed

rights are shaped and replaced by new improved seed variety crops of good quality. This is aiming at containing climate change effects of drought and creating adequate food security. However, more farmers still continue with planting local varieties. These contrasting differences in values and interests between local seeds over new seed varieties may have consequences towards more sustainable adaptation pathways. The national government development pathway seems to be lining on one side of drought policy without understanding small scale farmers' side. The above is in line with O'Brien, K. L. (2009) observation that values are shaped by the constraints and opportunities of a social system and such values differ between individual entities, institutions, cultural rights, and some have a cultural content.

Hence, the above raised concerns indicate that understanding and conceptualizing climate governance policies at various levels with related perceptions are different both in practices, knowledge and values. This is because what farmers value and need may be strategically different from what extension officers advocate for in the policy. The extension officers and NEMA officials with their policy knowledge may be interested in addressing climate change effects of drought. However, for small scale farmers values and interests reflect a demand for fast harvests without necessary concerned with climate stressors. We may assume that a few small scale farmers may not necessarily be concerned with policy understanding and factoring in the effects of climate change on farming. But farmers see the policy as a hard task put on them from national government by policy decision makers. Therefore, the continuous involving and interaction processes through local participation could be one of the suggested solutions. This will also help those farmers seeing the policy as a duty and task to more understand their vulnerability context through awareness. This is in line with Mimura (2010) observation that awareness-raising through improvement of enabling conditions is fundamentally important to create understanding of farmers and responsible government. The author further observed that, during this process, it is also important to identify the responsibilities, roles and collaborations between farmers, national policy makers and local levels authorities.

However, from above observation the differences in interests and values seem to be still wide between farmers and Alego Usonga County authority representing the national government. This could affect achievement of more sustainable adaptation pathways in Alego Usonga in Kenya. Therefore, according to Adger et al. (2012) expressed that in order to influence adaptive policy in future changes towards more sustainable pathways, it requires in-depth



understanding of how people in different settings identify risks, make decisions and implement policy actions, all mediated by their values, norms and traditions. Additionally, Eriksen et al. (2011) reflected that second principle suggests the need to ensure representation of groups that are vulnerable to climate variability and change is institutionalized in development processes.

**Principle 3: integrate local knowledge into adaptation responses.**

According to Woodhouse (2002) observation, initial key features of successful adaptation were held to be the use of local knowledge.

Majority of small scale farmers in Alego Usonga use firewood ash as a chemical resource to treat stored food crops and seeds. This can be assessed as knowledge known through local farming experiences. More farmers noted using green tithonia manure on plots whereas a few farmers could afford and use fertilizers. The local tithonia knowledge institutionalized in farmer practices is seen as an ingredient of improving soil fertility for better growth of crops. This improves farming and adaptive capacity because the food crops evade late effects of droughts. This is in line with Olsson & Folke (2001) observation that recognizing the importance of experiential knowledge is basis of paradigm shift for adaptive management. The authors further noted that integrating local knowledge based on experience of living in a risky place and of observing natural environment is essential for sustainable adaptation to climate change. This is because local soils in Alego Usonga are exposed to climate risks of drought and less fertile but can improve production when nutrients are applied (FAO 2014).

In Alego Usonga local knowledge is integrated into adaptation processes. This is by extension field officers encouraging and recognizing use of ash and tithonia as sustainable adaptation practices. One field extension officer acknowledged that “*We encourage cultural practices and values towards use of kitchen firewood ash and evade late climate adverse effects of drought*” (Interview with Informant 11, 31.12.2015). Such local knowledge could be integrated when field extension officers arrange and organize field exhibitions on a weekly basis. During exhibitions, other small scale farmers learn and gain new devolved climate policy ideas for adaptation. During this process such local knowledge is most likely to be integrated with devolved climate policies. Therefore, according to Eriksen and Marin (2015) integrated local knowledge is important for empowering vulnerable groups and furthering diverse local values and needs-not least the adaptive capacity of community as a whole in the face of dominant development discourses. And according to North (1990), local knowledge as an institution is a fundamental building block for economic development.

**Principle 4: consider potential feedbacks between local and global processes.**

This fourth sustainable adaptation normative principle builds on the recognition that actions by one group of individuals may affect others (Eriksen and Marin 2015). In addition, Eriksen et al. (2011) analyses such actions in terms of local-global linkages in sustainable adaptation with a focus on how adaptation in one place may lead to increased carbon dioxide (CO<sub>2</sub>) emissions or threaten environmental integrity at higher spatial scales (local-to global linkage). From this perspective, findings shows that sustainable adaptation practices and devolved climate policy interventions performed by small scale farmers in Alego Usonga can also contribute to environmental feedback problems and needs to be considered.

Demand for manure during farming through tree burning for ash emits carbon at local level. Similarly, use of subsidized fertilizers on farm to improve soil fertility can contribute to nitrogen emission at local level which later can spread far by crossing regional borders to global level. Global warming is due to temperature increase as a result of carbon and nitrogen emissions among other greenhouse gases. The emissions thus act as negative feedbacks which may have consequences if the practices continue over a long time. The negative feedbacks are thus both locally and globally linked and which later can affect adaptation to climate change in small scale farming over generation. This is in line with Eriksen et al (2011) observation that some adaptation practices often have significant implications for greenhouse gas emissions as continued global warming can mainly overwhelm local adaptive capacity.

Therefore, according to Gabrielsson (2012) fundamental shifts in local practices are required and in particular deliberate transformations aimed at influencing future change towards more sustainable pathways. This implies the need to reduce emissions and deal with the social and cultural causes of vulnerability (Pelling 2011; O'Brien 2012).

**Principle 5: empower vulnerable groups in influencing development pathways and their climate change outcomes.**

The fifth principle emphasizes that sustainable adaptation must go beyond discrete local actions, and instead significantly influence formation of pathways to equitable development (Eriksen and Marin 2015). Drawing from local and global negative feedbacks emphasized by fourth principle above, vulnerability to climate change in Alego Usonga is partly driven by development pathways but also the usual sustainable adaptation practices of farming. Therefore, due to some negative feedbacks achieving equitable development and empowering sustainable pathways may not be possible at equal levels for small scale farmers.

Therefore, Eriksen and Marin (2015) emphasizes that sustainable adaptation require a focus on decisions, practices and actions as elements of particular development outcomes (rather than just climate outcomes) including emissions levels, consumption patterns, wellbeing environmental integrity, equity and poverty. The national government seems to approach adaptation to climate change in Alego Usonga as a top down process that can be managed by devolved climate policy interventions. Involving small scale farmers in decision making can transform both local county and national relations through climate change understanding. By doing so devolved climate policies and their interventions can achieve intended adaptation outcomes for larger population as part of sustainable adaptation pathway rather than one way decision making. Therefore, livelihoods in Alego Usonga are closely transformed through interaction between devolved climate policy interventions, local adaptation practices and environmental change in local climate.

## **5.2. Policy diversity, integration and local forms of institutions” response to climate governance policies**

### **5.2.2. Climate policy perceptions and diversity of interpretations**

This sub-section explores policy perceptions and interpretations from informants. Climate experts, field extension officers, national environmental management authority officials (NEMA) and small scale farmers were interviewed. Empirically this sub-section illustrates how climate policy was understood, the content and underlying interventions. The reasons behind why such diverse interpretations are also examined.

#### **5.2.1. Climate policy perception**

According to Davis (1993) policy reflects a series of processes, interlocking steps, a dialogue between procedures and substance between public debate and private analysis which undergoes interpretations and understanding. Analysis is through interactions of values which are mediated through adaptation policy guidelines primarily aiming at supporting policy makers and involved stakeholders (Clar 2012). Climate policy according to informant climate experts is an intervention guideline. This is a more general and perceptual definition. Climate policy seen as a guideline indicates that interventions and adaptation processes concerning climate change are positively perceived as supporting farmers in Alego Usonga. Therefore, devolved climate policy interventions from national government to Alego Usonga Sub County can be seen as a guideline supporting adaptation to climate change in farming.

Climate change comes with effects. Majority of informant farmers in rural Alego Usonga noted that they were challenges related with effects of droughts and flooding on local crops which are close barriers limiting local adaptation. Crop loss due to drought was one of climate effects. To address such barriers, a few farmers perceived that behaviour change was part of coping and adaptation strategy. Field extension officers attribute behaviour change specifically in eating habits. The assumption change in eating habits is that Alego people could prefer eating food staffs that are softer with less fiber content and this is easily provided through new policy crop varieties. Also consumers on local market go for food staffs that can easily be cooked faster than staffs from traditional crop varieties. Local varieties are assumed enriched with starch and fiber content. Local maize flour is seen as starchy as compared to new maize varieties advocated in the devolved climate policy. The demand for new food crops due to change in consumption habits is also important in achieving adaptation to climate change. Therefore, climate vulnerability has led to introduction of new seed policy and through such strategies local farmers changed from planting traditional food crops to new ones to adapt to stressors. Hence, for climate policy interventions targeting food security to be adopted then the national government may consider investing in crops that can easily change consumption habits. Dovers and Hezri (2010) pointed out that policy interventions are means to behaviour change towards an agreed goal.

### **5.2.2. Climate policy content**

According to CDC (2012), policy content evaluation and interpretation examines substantive information and material contained within in relation to policy's requirements. While Dovers and Hezri (2010) expressed that policy and local institutions are complex, value-rich and defy characterization and exist in political environments where forms of climate uncertainty may be unfamiliar from a scientific perspective. Therefore, policy interpretation is important in identifying the extent to which its content clearly articulates requirements; improve future policy development and implementation (CDC 2012). Notions of devolved climate policy interpretation described by climate experts indicate that adaptation policy to climate change effects cannot stand alone as an intervention guideline. This is because the content has to be translated and supported by local forms of institutions. Climate experts interviewed observed that climate policy intervention failures may be attributed to lack of how policy is framed. Therefore, without any binding means in which the policy can be supported, adopting such interventions may be slow and weak. It is important to shape policy as a local institution in sense that norm and rules are also contained within. By internalizing policy in form of norms

or bylaws we enable climate policy work for itself like when norms operate once internalized in society. The assumption is that we create efficiency in policy governance. This also facilitates effective implementation of policy interventions by small scale farmers. This is in line with Heinrich (2010) assertions that every policy ought to be translated into law for effective implementation. Therefore, laws and bylaws sets goals that a society desires to accomplish in light of a recognized climate change problem (Heinrich 2010).

### **5.2.3. Why several diverse climate policy interpretations?**

Interpretation reflects ideal process of mainstreaming climate policy. Imran (2009) noted that mainstreamed approach is recognized by scholars and practitioners as necessary for dealing with climate change. From EU (2014) study findings, mainstreaming is important as it contains several elements aiming at strengthening policy. Mainstreaming therefore has clear set policy objectives through strategic priorities directly addressing climate change. Therefore, according to Imran (2009), lack of capacity for rural population to cope up with climate change in farming is a challenge. In Alego Usonga, climate change is a persistently varying phenomenon with likelihood of changing people's rural livelihoods, natural and agricultural resources base necessary for survival. Therefore, different policy interpretation approaches especially by climate experts exemplify the hard climate changes encountered by *Alego farmers* before, during and after hazards. Climate experts are important as they are closely related and involved in policy formulation and designing mechanisms for implementation. Their perceptions also demand effective mainstreaming and participation of various small scale farmers in defining them in local context.

Various policy diversity of interpretation by extension field officers who understand and have knowledge about local climate change is a means of establishing a climate policy process for negotiation. Through dialogue priority areas can be identified. This includes areas like considering effects of climate change on small scale farming. And therefore appropriate policy interventions can be formulated. Such interventions include introduced cassava cultivar in Alego Usonga. Cassava project was decided as the necessary intervention to climate change adaptation. The project was suggested by the national government after prior research had been done on crop viability and tolerability. The cassava policy intervention was further facilitated by local NGOs like Norwegian Red Cross in Siaya County. The cassava cultivar policy was initiated through mutual acknowledgement of the crop as a new variety that can survive in the area. The government and NGOs took an opportunity of introducing the project through established groups. The groups started as "merry go round" identities. With entry of

cassava cutting the name was changed to cassava group. The cassava food crop also reproduces with more stalks which can be planted locally. Therefore, small scale farmers supported and accepted the cassava intervention. This is due to locally available cuttings in supply during distribution among members. However, the problem of cassava mosaic disease is a risk to adaptation by affecting crop production.

However, irrespective of climate experts, extension officers and NEMA policy interpretations it is important to acknowledge that climate change adaptation has no lasting solution. Therefore, it is a matter of establishing a substantial policy framework in farming for implementation. This shows how climate notions, ideas, knowledge and choices are interpreted in meeting more sustainable adaptation.

Lessons gained here are that climate policy content does not contain common ground for particular definition at local and national level. Entire policy understanding and interpretation goes with what occur at that particular level and in time as a result of climate change uncertainty. This may vary with degree of climate risks individual and groups is exposed to and vulnerability for entire population. Thus, from various perspectives of policy interpretations, it follows that there is need for policy makers to define climate governance policies from a wider platform. This is done in order to attain desirable needs of vulnerable farmers.

### **5.3. Devolved policy integration, links and achievements**

#### **5.3.1. Devolved policy approach: grounded process of integration and implementation with desired end results/achievements.**

Stephen and Adnan (2010) noted that most climate change adaptation policy literature is more about what *should* happen (dealing better with climate uncertainty, etc.), but less on *how* integration might be achieved (policy structures and processes). In this sub-section, various ways of policy integration and links will be analysed. The sub-section begins with how policy processes from national to local level occurred. The analysis then reflects on how policy interventions have improved coping to climate change. The analysis further focuses on various mechanisms involved in integration of policy interventions into farmer practices. Later an analysis of lessons learned and why such diverse links are necessary for adaptation to climate change.

Davis et al. (1993) noted that no policy model of integration process can claim universal application since every policy process and achievement is grounded in particular

governmental institutions. Vertical policy integration approach “bottom-up and top-down process” may be used (Davis et al. 1993). This refers to coordination across political and organizational scales such as national, provincial, local and intersects with multi-scale policy governance, subsidiary and nested institutions (Dovers and Hezri 2010). Therefore in Alego Usonga-Siaya County various processes were used by local authority especially field extension officers to integrate devolved climate policy from National government. The process also involves linking policy with local forms of institutions.

Devolved climate policies interventions were grounded in local farming practices. This means that interventions were incorporated into farming activities governed by informal norms, rules, bylaws and cultural rights. At national level climate policies are designed like new seed crops to Siaya County. From Siaya County the policy is linked and integrated through various mechanisms to Sub County level of Alego Usonga.

### **5.3.2. Policy strategies for local coping and adaptation**

Climate change and vulnerability is nested and teleconnected through environmental change, people and policy information (Adger et al. 2009). At the heart of adaptation is need to address future uncertainty and as a consequence, the role that adaptive capacity plays in enabling communities to make changes to their lives and livelihoods (Eriksen and Marin 2015). In Alego Usonga, policy interventions such as new variety soya beans and new rice have enabled farmers to cope up from effects of droughts. According to interviewed informant small scale farmers, their views were that varieties of drought tolerant crops enable them to withstand and adapt to eventual uncertainty of climate change.

Climate change and its impacts across levels require adaptation policy responses that are equally diverse and inclusive (Eriksen and Marin 2015). They include vulnerability reducing measures, support for coping or absorbing capacity and efforts to build adaptive capacity which at local level are mainly directed to place specific climate impacts (Eriksen and Marin 2015). In Alego Usonga the cassava intervention represents a medium term approach to improve on livelihood. It is a narrow fair policy as compared and outlined in Marin and Eriksen broader vulnerability reduction measures. This is because cassava policy is partly an inclusive strategy against raised issues of climate change. The intervention target rural population areas. However, more specifically the most vulnerable farmers affected by climate change like single mother households. Eriksen and Marin (2015) acknowledge that development attributes of selected technologies are considered directly beneficial to social

development, as they are beneficial to the poor; and that the focus in practical application of technology frameworks is not so much on large capital-intensive investments.

### **5.3.3. Climate policy links**

While exploring local-level dynamics of people's vulnerability to climate change, of which adaptive capacity is a key component, it is important to find ways to embed such devolved climate policy measures into wider scales of policy assessment (Brooks et al., 2005; cited in IPCC 2007). Therefore, this sub section analyses links used to integrate devolved climate policies in Alego Usonga from national level. The sub-section answers the research question; how is county and national climate policy linked and integrated? More is explored on how each linked mechanism is used.

Field extension officers reported use of "*climate Women*" as elements of community social network in *Alego Usonga*. Climate women spearhead devolved climate policy integration within the area of study. They have links with households involved in small scale farming practices. In *Alego Usonga* on a collective responsibility level, gender roles of women with good relation and links in social gatherings deliver climate change policy information to other small scale farmers. This ensures facilitative integration of new policies with forms of institutions. This is in line with Eriksen and Marin (2015) findings that in Lake Victoria Basin across farming communities there are social dimensions that delineates people's lives and livelihoods which includes presence of gender regime that assigns gender-differentiated rights and responsibilities. Research also indicates that elements of institutionalized social capital (such as networks) with such responsibilities are important determinants of social resilience and responses to climate change policy integration (IPCC 2007).

Holding public plant health clinics meetings in different parts of Alego Usonga by extension officers are also important in disseminating climate policy and its intervention. The meetings are between local farmers and Siaya County government officials. During such meetings discussions are done and small scale farmers raise climate change concerns and impact. This also involves small scale farmers holding representative officers responsible to act on diseases affecting crops. Therefore, Cleaver (2012) acknowledged that through repeated social interactions people are thought to develop habits necessary to democracy, learning to exercise voice in public fora and to hold policy decision- makers to account. Hence, it is through participation that people express their needs through representatives providing space for good governance (Houtzager and Lavallo 2009).



Capacity building was reportedly influential to ensure policy interventions become successful. According to AEA (2010) capacity building is a continuous support package on an ad-hoc basis to respond to climate change and integrate climate resilience into development strategies. Thus, capacity building is important for climate change as responsible authorities can easily use a variety of tools, such as high level dialogue of face-to-face, facilitated consultation and participation to create consensus and identify priorities for adaptation and mitigation (AEA 2010). In Alego-Siaya, institutionalized capacity building workshops (ICBW) is held locally at county level. ICBW are beneficial as devolved climate policy sharing of ideas, trainings and teachings are done about climate change adaptation policies. The advice provide some room for small scale farmers to improve on farming skills and in the process integrate policy strategies into local activities. Therefore, the above analysed content is in line with Hekkila et al. (2011) who asserted that devolved development approaches of resource management can be strengthened through policy reform and capacity building particularly in initiation to cooperate. Through capacity building responsible governments are able to provide advice on climate change and policy implementation through training potential entrepreneurs (AEA 2010).

#### **5.3.4. Why diverse variety mechanisms of integration and links in Alego Usonga-Siaya?**

Most concerned question is to explain why such huge varieties in climate change adaptation. Moreover, why such diversity is important and necessary towards linking national policy in Alego Usonga

Policy links are key mediating bodies that connect households to local resources. They determine how flow of external support will be distributed among different social groups and link local populations to national policy interventions (Agrawal 2010). Therefore, climate governance takes place through multiple layers of nested enterprises- a diverse mosaic of linked subunits (Andersson & Ostrom 2008; cited in Cleavers 2012). Furthermore, underlying ideas about polycentric resource governance are assumptions that diversity and richness of associational relations constitute an institutional policy resource (Clever 2012). From this perspective, in *Alego Usonga* various diverse mechanisms of policy link can be termed as means in which climate policy interventions are practiced. Therefore, in order to reduce local vulnerability to climate change, national, county government, field extension officers have to diversify simpler measures which can be accessed locally by farmers. This means that small scale farmers need to be involved during process of planning at local level.

A diverse linked sub unit of cassava groups, chief's social arrangements, CLPKS, field aids institutions, climate women, plant health clinics, trainings and ICBW are important where good climate policy insights are dominantly and dimensionally instituted. Such diversity comes with lucrative knowledge and practical experiences. The mechanisms contribute to local policy development in farming practices through which timely adaptation measures can be adopted in Alego Usonga. These measures may be aimed at reducing vulnerability to specific weather-related threats or building farmers ability to cope with and recover from unexpected events (Eriksen and Marin 2015).

Moreover, such diverse links involving participatory process help vulnerable farmers in Alego Usonga to integrate prioritized adaptation strategies and policy interventions. Involving diverse linkages and integration while devolving adaptation policy in rural areas shows the ability of how climate change can be tackled immensely through developing various systems of adaptive governance.

The vulnerability of communities to future climate change therefore depends in part on their adaptive capacity through which adaptation measures can be adopted (Eriksen and Marin 2015). Diverse mechanisms of linkage seems to be the most reliable rural networks and applicable means through which policy can be adopted at particular stage depending on vulnerability context, adaptive capacity and climate variability in Alego Usonga region. The applicable means also enables field extension officers to reach most remotes areas of rural farming, connecting households delivering devolved climate policy information. In *Alego*, small scale subsistence agriculture is dependent on natural water rainfall resources and such adaptation policy integration mechanisms are suitable, necessary and important to climate change adaptation. They can be termed as better and optional mechanisms in climate vulnerable rural areas of *Alego Usonga*.

### **5.3.5. Lessons learned for vulnerability adjustment and adaptive capacity.**

From findings analysed above, the learning from such huge diversity of linkages and integration among *Alego Usonga* farmers is that climate change comes with various adaptation challenges that may prevent adoption of climate policy interventions. Increased diversity is a better avenue to recognize and empower local farmers. This is because each linked mechanism used, various participatory and involvement methods are rooted and utilized. Therefore, various diverse processes of policy linkage promote efficiency in climate policy development. This later can encourage more engagement with small scale farmers in Alego Usonga to understand their vulnerability context by identifying areas for change.

Cleaver (2012) confirmed that such several linked diversity of slotting together with various levels of managing activity is thought to combine benefits of adaptive management and democratic policy resource governance.

It is important to note that huge diversities of climate linkage, various diverse policy perceptions and interpretations in theory is a shift in how climate change is approached. This also indicates how policy interventions can be adopted in practice to address sustainable adaptation in farming areas of Alego Usonga. This shows how climate policy notions can be directly linked and target areas that encourage adaptive, productive and sustainable farming in Kenya.

#### **5.4. Local forms of institutions” response to climate governance policies**

This section begins by examining how informants’ perceived local forms of institutions. The main focus is on responses of local forms of institutions and how they are shaped by devolved policies in adaptation to climate change. More is examined how such policies shape or constrain forms of institutions in farming. The section concepts in particular are derived from interviewed extension officers and farmers responses. Climate experts’ views are also considered. The question this section seeks to address is: do what extent are devolved governance policies support more sustainable adaptation pathways in Alego Usonga in Kenya?

##### **5.4.1. Local perceptions of institutions**

###### **5.4.1.1. Institutions as informal rules/rules**

Throughout history of societies, human beings have long constructed and devised institutions to create order and reduce uncertainty (North 1991; Dovers and Hezri 2010). Adaptation and abilities to undertake local institution adaptive responses will be defined by: differences in climate exposure and biophysical settings, legal, political and institutional systems (Dovers and Hezri 2010). Hence, rules can be implicit and informal and yet still order the perceptual way in which things are done (Evans 2012). And roles of local institutions responses shapes how policy decisions by bureaucrats are taken and enacted from perceived pre-established rules and procedures through which institutions respond to real issues (Evans 2012). In Alego Usonga small scale farmers perceived local forms of institutions as informal rules. The informal rules or rules responses are to stimulate policy process through political argument towards climate change adaptation. Through reason and understanding, better policy interventions can be arrived at in determining adaptation to climate change and rules are

important as regulating instruments. The learning from here is that such responses of rules enhance and enable policy makers from national government to establish desired adaptation policies. Hence, in climate change adaptation informal rules in small scale farming are also important as regularizing governance tools. In climate change adaptation and mitigation strategies, political concepts in decision making process are therefore made following related rules. Thus Dovers and Hezri (2010) emphasized that institutions are the means whereby transactions between individual farmers, groups, and state are mediated and made tolerably predictable: the rules by which we organize our interactions.

Individual farmers further perceive informal rules as guiding towards ultimate goal and commitment of improving local livelihoods. Informal rules govern farming and crop practices in adaptation to climate change. This means that small scale farmers follow informal rules designed by them. The informal rules are therefore to control farming relations. For example, in Alego Usonga the informal rule of guarding along the fence while burning the bush in readiness to prepare land for farming so that fire does not cross over to the neighbors plot. Not unless if fire cross over then one will be responsible for the damage. Therefore, the informal rule is self-suctioned.

Informal rules responses to policies are important. For example, cassava informal rules coordinate and control groups actions under observation of group patron. Coordination ensures members receive cassava supply for food production. Informal rules therefore regulate operations of cassava policy in Alego Usonga. This is closely in line with IFAD (2001:26) acknowledgement that local famers' users have comparative advantage over government agents in managing resources; "they can design more efficient rules and more easily monitor and enforce them".

Moreover, an extension officer expressed that informal rule act as key link between authority and climate vulnerable farmers. Important adaptation lesson is that local authority officials have to consider operations of designed informal rule in question. Which links both of them (farmer and officials) when responding to climate policy interventions in Alego Usonga. This means that institutions with clear farming roles, rules and lines of accountability will help to respond and shape desirable governance arrangement measures and local climate interventions (Grindle 2007).

#### **5.4.1.2. Institutions as forms of climate norms**

According to North (1990), norms are forms of institutions while Arild (2005) perceived that norms as institutions also take variety of forms. Therefore, interviewed informants climate experts perceived local institutions as forms of climate norms. In other words climate experts have coined the term climate norms from usual known norms. The interpretation is that climate norms deals with climate change problems due to the underlying attached human values. For instance, using our previous example of seed policy it can be perceived as climate norm or new norm in farming because of early maturity value. Thus, is referred to as climate norm replacing the informal norms in farmer's practices.

Climate norms responses are to build farmers' capacity to adapt to effects of climate change through individual responsibility of implementing climate interventions. Hence, if farmers had similar norm in operation, the assumption is that adopting the new norm (example new cassava variety crops) maybe possible. Thus the learning here is that by institutionalizing climate norms the response is we enable reinforcement of adopting climate reforms and in particular climate agricultural laws for adaptation. Hence, local institutions mediate the influence of any external interventions on adaptation practices (Agrawal 2010).

#### **5.4.1.2. Informal norms as traditions**

The above sub-section has described informal norms reconstructed as climate norms. In this sub-section however, informal norms are also perceived differently. They are referred to as traditions.

Small scale farmers perceived that informal norms are similar to traditions. In other words, norms can be transformed into traditions. The tradition will therefore guide daily farming practices. Once local farming norms are embodied in local traditions the response is that they assist in solving farm grievances among climate vulnerable farmers in Alego Usonga. This takes as to the concept of internalization which indicates that once norms are fully internalized, they become part of the society. Hence, the adopted new seed norm into small scale farming improves adaptation to climate change. Therefore, it is important to note that the norms as traditions and their responses are to incorporate new policies into local farming activities improving on rural adaptive capacity. The above is in line with Cleaver (2012) who acknowledged that local traditions of cooperation they provide building blocks of good resource management and governance. And according to Arild (2005) when norms are fully internalized they work via a feeling of guilt and no external sanctions are necessary and solve

internal grievances by followers observing the norm. The author further noted that adopted norm binds everybody to the collectively sensible solution. This is because community norms often include the right for a living for all (Cleaver 2012).

#### **5.4.2. Local forms of institutions shaped by and shape policy interventions for adaptation.**

##### **5.4.2.1. Devolved policy shape local institutions adaptation action in Alego.**

Institutions structure impacts of climate risks on households in a given social context. They shape degree to which households' policy responses are likely to be oriented, individually or collectively (Agrawal 2010). In Alego Usonga, devolved climate policies have had impact on local forms of institutions. The new policies seemingly shapes local forms actions enshrined within farming.

This is due to increased vulnerability to droughts. Therefore, small scale farmers in *Alego Usonga* have to diversify and develop adaptation practices which are enhanced by new policies in order to overcome climate change risks in the area. For instance, a farmer developed house life coping mechanism and noted that *“less harvested maize was not for sale, stored for future because is vulnerable to hot weather, new cassava in plenty is for sale because it grows in try weather”* (Interview with informant farmer10, 05.01.2016).

From adaptive capacity perspective, the above informant coping mechanism indicate that in *Alego Usonga* devolved climate policies interventions are sometimes undertaken as individual oriented means towards attaining food security. This is against the larger goals of climate policy interventions oriented towards supporting entire adaptive capacity of vulnerable population. Climate policy has enhanced small scale farmer's adaptation to climate change. The policy has shaped some local institutions because traditional crops practiced according to informal norms were vulnerable to risks of drought in Alego Usonga. Therefore, the above informant farmer statement is in line with Andersson and Gabrielsson (2012) that most adaptive responses to increased climate change and uncertainty become based primarily on reactive and autonomous individual coping mechanisms, like resource diversion and reduced food intake, rather than planned adaptation strategies which are more likely to increase overall population livelihood security and wellbeing.

Moreover, over history some institutions have been shaped, transformed by policy interventions and others changed (Dovers and Hezri 2010). Devolved climate policies have effects on farming. In Alego Usonga, climate policies have shaped actions of cultural values

and rights in farming practices. *Climate expert interpreted that new seedling policy has enabled change in people's attitudes and farming values so that they prefer to change adaptation.* This indicates that policies have had actions on farmers' traditional cultural values and rights to further adaptation. For instance, the seed that was grown traditionally in Alego Usonga has been substituted by new seeds through climate technology.

In addition, Uphoff and Buck (2006) noted that a more basic strengthening and shaping of rural local institutions involves devolution. Hence, adaptation to increased effects of climate change and variability will require policy interventions to change behaviors across multiple sectors, requiring institutional settings constrained by policy processes (Stephen and Adnan 2010). Devolved agricultural laws have constrained informal farm rules and norms in Alego Usonga. Some informal rules and norms of spreading seeds on farm land have been replaced by formal laws, formal rules and bylaws. The changes are due to climate policy guidelines demanding farmers to plant seedlings in line using a measurement robe. This is a formal guiding rule. This is observed as an adaptive and coping measure to climate change because the seeds are fully covered with soil afterwards. The assumption here is that complete covering enhances seed germination in the soil for better adaptation outcomes. The traditional method of spreading seeds following informal rules is seen as vulnerable to effects of climate change as they are exposed to sun. The ox-plow practice may not cover the seeds fully into the soil. Thus affects farmer's adaptation to climate change.

#### **5.4.2.2. Climate policy coping and adaptation support, enhance individual capacity and limit small-scale farmers.**

Climate policies in Alego Usonga have changed local forms of institutions. Policies have shaped values instituted in informal norms and informal rules. This is through some farmers' capable to change from using traditional hoe to tractor use policy in preparing land. These reported changes by informant small scale farmers indicate that there is an additional value and or more adaptation (adaptation +) at individual capacity for rich and large scale farmers by using tractor services. This is due to large scale farmers' capability to afford tractor services from Siaya County and prepare land on time. The policy support therefore enhances coping and adaptation due to timely response in farming. Hence reduces vulnerability context from frequent drought stressors at an individual capacity. However, this can also be a choice by individual farmer to use tractor or ox-plough depending on whether rainy seasons are imminent or not. Vatn (2005) asserted that a norm, if internalized, defines which alternative to choose.

However, incapable small scale farmers use hand labour. This is time consuming to prepare land as the process may be slow. This increases vulnerability due to climate change. However, human capital is a cheap labour source for such farmers once done on time if only climate uncertainty can be predicted early. Therefore, changes in operations of institutional set up from using traditional hoe or ox- plough to Alego Usonga county bylaws recommending tractor use has seen policies shape such informal forms enabling and limiting some farmers at different levels and capacity to adapt to effects of climate change. This is in line with Stephen and Adnan (2010) assertions that, if climate change represents a shift in the operating environment of societies, then institutional change is necessary so that policy processes allow decisions to be informed and made differently and more attention must be paid to the mechanics of such change.

### **5.4.2.3. Local Institutions shape, mediate and translate policy interventions into local context**

#### **5.4.2.3.1. Cassava cultivate rules and norms of practicing**

According to Agrawal (2010) postulated that although unavoidable local adaptation always occurs in an institutional context. Such institutional arrangements structure risks and sensitivity to climate hazards, facilitates individual and collective policy responses and shapes outcomes of such responses (Agrawal 2010). And according to Voigt (2007) hypothesized that enforcement of such formal institutions is likely to be heavily influenced by a number of informal institutions. Therefore, in Alego Usonga more sustainable adaptation can be achieved through farming and activities of cassava group. The cassava policy interventions are influenced and locally institutionalized in the group's operations.

The existence of local institutions cements group's relations. Therefore local forms of institutions response are to mediate actions of policy interventions in local farming in adaptation to climate change. For instance, during group interviews informant members reported that they have local binding rules. The informal rules mediate rotational cassava cultivars distribution. Policy interventions are therefore practiced within the group. The group member's act as social capital in which organized interactions such as harvesting of products is done together. The defining and organizing binding informal rules shape, enforces and ensure that each member has a responsibility. The responsibility is to reciprocate by ensuring that the cuttings reach all members as per the informal governing rules. Hence, people as social entrepreneurs; consciously invest in institutional relationships of trust and the creation of norms in anticipation of reciprocity and tangible benefits to further sustainable livelihoods



(Ahn et al. 2003). Cultural norms and relations of association constitute the social cement which can be utilized to strengthen institutions and reduce transaction costs of cooperation (Cleaver 2012). Social capital in form of cooperation and trust embodied in associational relationships allegedly make institutions to shape better workable policies (Cleaver 2012). The function of such institutions must therefore be appropriately embedded in social milieu from which the norms to support purposive policy decision making can be drawn (Ostrom 1990).

Therefore, institutions operate through sets of codified rules, but they are also characterized by habitual actions and traditions that guide behaviour in relation to governing (Evans 2012). In governing, cassava rotational norm restricts and ensure farmer adhere to practices. Therefore, such defining forms of institutions have facilitated adaptation to climate change in farming through cassava intervention. This is in line with Agrawal & Perrin (2008) who noted that local institutions shape the acquisition and distribution of these interventions in fundamental ways, thereby affecting the degree of success of such interventions for adaptation to climate change.

## **5.5. Local sustainable agricultural practices:**

### **5.5.1. Adaptive practices, which Shape local Responses to Climate shocks and stressors in Alego Usonga.**

This sub section analyses sustainable adaptation practices to climate change done by small-scale farmers.

Majority of farmers' sustainable adaptation practices include use of drums and canes to harvest water and irrigate crops while a few of them adjust and respond to climate change through farming other local food crops like *finger millet and pearl millet*. However, majority of small scale farmers have knowledge of planting deep rooted *Nepia* grass around and along borders of the plot to make use of limited land and space. These are coping mechanisms, in which the grass grows well in semi-arid areas of Alego Usonga, harvested and fed as fodder to local livestock. Legumes such as traditional vegetables (LTV) are highly cultivated. The greens and food crops utilize less water resources during small scale irrigation and also tolerate semi-arid and humid region of Alego Usonga. This ensures a more sustainable adaptation pathway. Therefore, developed drums and locally invented watering canes acts as water-harvesting structures. They have improved local peoples adaptation and their effort of ensuring sustainable small scale irrigation to tackle combined effects of droughts and flooding. These are short term local adaptation approaches which plays important role

towards reducing vulnerability to climate change. This is because sustainable adaptation pathways call for new innovations in local practices. This is in line with Woodhouse (2002) who indicated that some of 'rural' farmer's problems are primarily a problem of low farm productivity and therefore using 'scale neutral' technology through improved methods of water control and access can increase productivity. And according to Eriksen and Marin (2015), such diverse strategic measures assist to ensure re-stocking after droughts and flooding which is one of sustainable adaptation approach that considers multiple development pathways.



## CHAPTER 6: DISCUSSIONS AND CONCLUSION

The main objective of this thesis is to gain more insights into the roles of planned national climate policies and responses of village level institutions in adaptation in farming communities in rural Alego Usonga. The study used a qualitative methodological approach with semi-structured and group interviews, key informants and observation as main data collection methods. Findings in the study demonstrate how the national policies, devolved to Alego Usonga County level have shaped local institutions involved in adaptation in rural area. Responses of local forms of institutions have also shaped national climate policies among small scale farmers in Alego Usonga in Kenya. The interaction between local forms of institutions and devolved policies influences the choices, interests and values small scale farmers make which later determine how they adapt to climate change. The nature of the interaction is critical for how sustainable adaptation can be supported. The policies are thus linked, integrated through various mechanisms and adopted in local context in farming practices. Responses by local institutions and policy interventions in agriculture are thereafter examined using normative principles of sustainable adaptation framework. The overarching question the research seeks to address is: *How have vulnerable small scale farmers adapted more to changes in local forms of institutions in response to devolved climate policies in Alego Usonga?*

Devolved five year action plan consisting of policy reforms partly and narrowly meet the first principle of sustainable adaptation recognizing contextual vulnerability approach. The vulnerability looked upon by policy intervention focus on single local stressors alone. This is where the government understands local vulnerability context as a result of increasing drought, flooding and inability of local farmers to cope up with effects of climate change. This is a low adaptive capacity in farming which is a classical outcome vulnerability rather than normatively emphasized contextual vulnerability. From climate policy perspective, climate change is seen by the government as a factor increasing vulnerability to local small scale farming. From observation, climate change has emerged with new striga weed. The weed has adverse effects on agriculture and is a climate stressor because it competes with maize crop for soil fertility. This increases small scale farmer's vulnerability as maize production goes down. The national government through Alego Usonga Sub County has introduced desmodium plant to control the weed. This strengthens low adaptive capacity. Therefore, contextual vulnerability type measures would be addressing social and environmental factors generating vulnerability, and not by focusing on one stressor alone.

Climate policies do not effectively address differing interests and values instituted in second principle of sustainable adaptation. Differing interests and values among small scale farmers are not conclusively supported. Policy implementation at the time of research does not recognize interests of some small scale farmers. The farmers don't like areas where they are being tasked. This indicates prevailing differing interests both among small scale farmers and between small-scale farmers and government authorities. Differing values may act as a barrier in promoting better adaptation outcomes. This is because values reflect different choices and preferences that are held individually or in a group and may act as constraints to adaptation. If an individual farmer goes for early maturity food crop policy intervention due to preferences over less adaptive traditional crop varieties then this may not be necessary similar attribute for a grouped farmer or another small scale farmer. Furthermore, policy goals and purpose might have not met adaptation outcome of some farmers according to instituted values. Given that there are always differing values and interests, the lack of understanding and recognition of these by the policies might have been the barrier to supporting adaptation outcome in farming. Thus policy interventions to an extent are ineffective as they do not take the local vulnerability context, institutional setting, differing interests and values into account. However, there have nevertheless also been instances where the interests and understandings of policies and local institutions coincide, contributing to effective policy implementation. For instance, the adoption of early maturity crops potentially contribute to reduced climate risk and vulnerability for some farmers. This has caused change in local informal norms and rules due to change from some traditional crop varieties to new crops emphasized in the policy.

Devolved national climate policy meets the third principle of sustainable adaptation and recognizes traditional knowledge into adaptation responses. Local authorities in Alego Usonga particularly field extension officers embrace and build their initiatives on Alego Usonga farmers' local knowledge. The cultivation of improved traditional high value food crops (THVC) and farmers being encouraged to continue farming such crops potentially strengthens adaptive capacity. The policy seed knowledge is therefore integrated with local knowledge through organized field exhibitions on agricultural farms. In Alego Usonga the development policy pathways are spearheaded mainly by field extension officers representing the two governments; Alego Usonga in Siaya County and Central government in Nairobi.

The fourth principle of sustainable adaptation concerns potential feedbacks between local and global processes. Some national policies interventions and local sustainable agricultural practices can have effects of increasing vulnerability to small scale farmers when considering

potential feedbacks between local and global processes. Some adaptive responses in agricultural practices and policy interventions can contribute to global carbon dioxide emission over time from local production increasing vulnerability. Through national policy interventions and methods of land management systems exposes top soil, increasing likelihood of carbon escape into atmosphere rather than sequestration. Similarly, policy of nitrogenous fertilizer application may lead to further leakage of nitrogen into environment and atmosphere as one of dangerous greenhouse gas. In other words, this means that a shift in agriculture to high input intensive agriculture would contribute towards higher emission development pathways. Besides some negative policy interventions, the small scale farmer's response of cutting down trees for land preparation reduces capacity of carbon sink. Moreover, the local farmer's adaptive response to climate change by performing traditional method of bush burning also increases vulnerability. The context in which vulnerability is increased is through the practices contributing to local and global carbon emissions. Therefore, lessons here is that some efforts deployed by rural farmers and government to strengthen local adaptation and adaptive capacity through traditional practices and national policy interventions cannot be isolated from usual development pathways of carbon emissions from western models of development. Nevertheless, perhaps the emissions from these local farmers might be quite small compared to western farmers.

Climate policies interventions partly meet the fifth principle of sustainable adaptation by empowering vulnerable local farmers in influencing development pathways and adaptation outcomes. Empowerment in decision making process in Alego Usonga can be seen influential in farming arrangements especially the cassava group initiative where cassava policy is practiced in farming. Some small scale farmers are therefore closely involved in development decision processes. Farmers within the group get involved in determining direction of planting, distribution, supply and all these mediated and regulated by local forms of institutions for instance informal norms and local rules. The farmers therefore to an extent have owned the cassava policy initiative in practice. However, it is not only allowing small scale farmers to do it their way but empower and encouraging them to own climate policy development pathways, ideas, take steps and develop methodology. This encouragement is done by field extension officers. This could be done through locally organized and arranged public health clinics where grouped farmers within the locality converge for advice from field extension officers, hold county authority to account, deliver and express their climate change concerns and needs which provide good portfolio for good governance. Through the

institutionalized capacity building workshops (ICBW) farmers are relatively engaged generally in sharing of policy ideas through dialogue about climate change adaptation.

To arrive at application of sustainable adaptation framework instituted in five normative principles the focus reflected partly on perceptions and interpretations of climate policies by various actors, climate experts, NEMA officers, Agricultural extension officers in relation to farmers adaptation responses. Climate policy has been interpreted in many ways; as a guideline consisting of climate interventions; as tools to assist manage climate change stressors and cause behaviour change. The policy is perceived as a mechanism consisting of new knowledge which aid small scale farmers transform from traditional farming experiences to new development pathways. Such diverse interpretations and perceptions aim at strengthening and making clear priorities that directly address climate change. Interpretations and perceptions show the process in which climate policy is developed. This is through negotiation and dialogue generating means for identifying priority areas in a changing climate in a local context for adaptation.

Understanding interaction between devolved climate policies and local institutions is important for the extent to which policies are adopted in Alego Usonga. Adoption of seeds and other policy interventions can potentially contribute to positive adaptation outcome from climate change effects.

Perceptions towards local forms of institutions are varied. Institutional forms are perceived as climate norms, informal rules and farming traditions by climate experts, field extension officers and informant farmers. One important aspect of perceptions was the way that local institutions were regarded. First, institution forms were regarded as informal rules and efficiently designed by local farmers. Informal rules regulate how small scale farming practices are done and managed. New seed varieties and food crops are planted on farm following rules. Therefore, to strengthen adaptation, local forms of institutions responses to climate policies determine how devolved seed crop policy measures are practically applied. For example, some farmers will determine whether to continue spreading seeds on farm according to informal rules or follow the formal rules in the policy on how to plant new crops in line. Second, local institutions were regarded as forms of climate norms. However, the climate norms are first internalized and perceived as informal norms. The informal norms hence facilitate how small scale farming should be done. For instance, informal norm instituted in cassava group where members have to make sure there is full distribution of

cuttings as a norm to all. Third, traditions once internalized regulate how small scale farmers practice planting of crops.

Furthermore devolved climate policy shape local institutions adaptation actions in rural farming. To strengthen adaptation some farmers individually or collectively have changed to new drought tolerant crops instituted in the policy. Hence farmers to an extent can cope up and adapt more to climate change. Therefore, adaptation process can be supported through the interaction between climate policies and local institutions. The support can be by providing a common understanding of key features and conditions relevant to adaptation processes. This involves building on experience of small scale farmers' local knowledge combined with fertilizer application policy. For example, the local knowledge of using firewood ash as manure to improve soil quality by small scale farmers in Alego Usonga is an important experience in practice. Combined features of using firewood ash as manure and fertilizer application on farm can be important in supporting more sustainable adaptation pathways irrespective of the contributory effect of carbon and nitrogen emissions they may fairly produce. Hence adaptation can be supported by national policies interventions (such as fertilizer) grounded in local farming practices through climate land potential knowledge system (CLPKS) guiding tool. CLPKS is a national government initiative that aims to increase support for local adaptation activities among small scale farmers in Alego Usonga. CLPKS is a soft ware tool that provides rural adaptation consisting of guidance through adaptation planning and how small scale farmers can implement policy measures. The software tool accessed through cell phones facilitate easy access of up-to date information concerning climate, local climate change for early systems warnings, methods of farming needed in land preparation among others.

However, in supporting local adaptation to climate change, devolved policy support may have increased strain on farmers in rural areas. Some small scale rural farmers are tied to right to new seed polices, doing away with some of traditional seed rights of storing seeds and this is a limitation for those farmers not able to access such services on time. Hence, devolved policies may actually undermine and constrain the adaptation process and potentially increase the vulnerability context of some farmers.

Important lessons can be learned for climate change adaptation. Lessons are that mentoring small scale farmers by field extension officers during field exhibitions and using them as key mentors strengthens rural farmer to farmer learning. This is also achieved by climate policy links and integration through locally institutionalized capacity building workshops (ICBW)



and local trainings. Moreover, small scale farmers working themselves in organized group and designed farmers groups creates more adaptation impact. The cassava group arrangement of twenty members per group can be one important example used in facilitating adoption of devolved policy measures. The use of “*climate women*” in policy and agricultural practices has quietly broken gender cultural barrier and increased women responsibility of participation in disseminating climate change policy knowledge. Climate women referred to as agriculturally practicing leaders with knowledge, experience and ideas about area climate change and who can also be taught new policy measures. The climate policy knowledge is further locally adopted into farming norms, informal rules and rights.

Therefore, understanding positions informal rules, norms and cultural seed rights have within local context the response is we enable adopting climate policies. Informal rules acting as link between authority and climate vulnerable farmers are critical for adaptation process. This is because they are important in determining how adaptation process can take place locally and in practice.

Adaptation + (plus) can be realized through integration and links of climate policies at local level. Lessons learned from merger between fertilizer application rules and local knowledge of using decomposed tithonia to improve soil quality can be termed as adaptation +. This is an additional value that climate policy adds to local knowledge of manure use on farm and evades climate change risks of drought in farming. Adaptation + also goes along with desmodium use. The parasitic plant inhibits growth of weed that comes with changes in the environment and this is counted as an additional value to adaptation. Hence, events of unpredictable climate change in Alego Usonga have therefore changed the way of house life adaptation strategies for local coping. Local farmers have the desire to make adaptation adjustments to cope up with changing climate.

Finally, policy devolution to some extent can limit local forms of institutions adaptation responses to climate change. However, to larger extent national policies improve local small scale farmer’s adaptation to climate shocks and stressors of drought. Local forms of institutions shape climate policies. However, climate policies have more influence in facilitating and shaping changes in traditions, cultural seed rights, informal rules and norms. This is due to incentive attached to the policy for sustainable adaptation pathways.

To sum up, the importance of this study in relation to others is that devolved climate policies interventions can also undermine environmental integrity associated with sustainable development. Hence, this can affect small scale farmers’ adaptive capacity to adjust from

effects of climate change in practice. Sustainable adaptation principles are very important means to analyse vulnerability context, and effects of development pathways on farmers' practices in Alego Usonga. However, in order to understand more sustainable adaptation is to find ways and mechanisms in which small scale farmers can for themselves operationally apply the principles in practice. This will enable small scale farmers to influence their own long term adaptation process rather than government seeing future sustainable adaptation pathways in the lens of short term policy interventions in Alego Usonga. In literature, several studies have found out that local forms of institutions are known to maintain some coherence, resilience and persistency in farming societies. However, it is important to acknowledge that some institutions in small scale farming practices can be changed and transformed. The cultural seed values and informal norm in Alego Usonga have subtly been transformed through sustainable development pathways. In literature review the policy does not operate in a vacuum, hence in this study context the devolved national policy is instituted in farmer's practices mediated by local forms of institutions.

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## APPENDICES

### *Interview Study Guide for Climate Experts Informants*

*-Purpose: get more insights over how local forms of institutions are shaped by and shape devolved policies.*

#### **What is climate policy and change in local forms of institutions?**

- i. What is climate policy in your own understanding?
- ii. How do you perceive actions of devolved climate policies in relation to rural farming?
- iii. In your own opinion, how do climate policies improve local coping and adaptation in small scale farming?
- iv. In your own opinion, what changes do local institutions have on climate policies?
  - a. Mention any changes:-----
  - b. How do the above mentioned changes shape and affect climate policies?
- v. In your own opinion, how does devolved climate policies change local forms of institutions instituted in small scale farming and how does this happen?
  - a) Mention any changes that occur:-----
  - b) In brief, how do the above mentioned changes shape informal norms, rules and farming cultural rights?

### *Interview Guide for Individual farmers and farmers' focus group*

*Purpose: To get an overview over how small scale farmers adapt to climate change broad about by changes in local forms of institutions*

#### **How do various small scale farmers align themselves to the institutional changes for adaptation in Alego Usonga?**

- i. As a farmer how do you perceive institutions supporting your local farming?
- ii. In your own opinion as a farmer, how do you relate such institutions to climate change adaptation?
- iii. What changes in local forms of institutions affect your small scale farming?
  - a) Mention any changes in your own terms-----
  - b) How do you respond to such changes to evade climate risks of drought and flooding?
- iv. From your experience, how have climate policies affected your usual traditional farming, values, informal rules and norms?

- v. Know that the central and local government emphasizes local farmers adoption of devolved climate policies, how do the policy instruments:
  - a) Improve your local institutional farming?
  - b) Reduce climate risks exposures and vulnerability to achieve additional adaptation + in informal norms, rules, cultural crop values and your farming practices?
- vi. What are your views and experience about change from local informal cultural norms and rules of old traditional valued seedlings/farming over new agricultural laws and policies)?
- vii. How do you view and reflect on the changing roles and forces of devolved climate governance policies to adapt to your potential farming values and usual institutional practices?

***Guide for Local county Officials and Key Informants***

*Purpose: to get an overview of how the government polices works and linked to enhance adaptive capacity.*

**How is county and national climate policy linked and integrated? And do what extent are devolved governance policies support more sustainable adaptation pathways in Alego Usonga in Kenya?**

- i. What are your ideas and views about adoption of devolved climate change policies geared towards future sustainable adaptation among rural small scale farmers in Alego Usonga Sub-County?
- ii. How have the newly introduced agricultural laws and formal reform rules of new crops, helped to solve/ address food security problems for rural people’s livelihood?
  - a) If know, how-----
  - b) If In the future, how-----
- iii. Policy Links
  - a) What are the mechanisms for linkage?
  - b) And how does the mechanism work in relation to adopted governance policies to enhance sustainable adaptation in farming?
  - c) What are the policy strategies and measures instituted during linkage and integration for more sustainable adaptation?

- iv. How do you integrate climate policy with already local forms of institutions in place to achieve additional adaptation (Adaptation +) among small scale farmers?
  
- v. Explain whether formulated and devolved policies shares common agricultural values and interests among small scale farmers in this area towards sustainable adaptation to climate change?