

Institutional assessment of adaptation to climate change in the middle Kaiti watershed, Makueni county, Kenya



RESEARCH PROGRAM ON
**Climate Change,
Agriculture and
Food Security**



ILRI PROJECT REPORT



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Enoch Ontiri and Lance W. Robinson

International Livestock Research Institute (ILRI)

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ILRI is a member of the CGIAR Consortium

Box 30709, Nairobi 00100, Kenya
Phone: + 254 20 422 3000
Fax: +254 20 422 3001
Email: ILRI-Kenya@cgiar.org

Box 5689, Addis Ababa, Ethiopia
Phone: +251 11 617 2000
Fax: +251 11 617 2001
Email: ILRI-Ethiopia@cgiar.org

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Executive summary

The International Livestock Research Institute (ILRI) conducted an assessment of institutional dimensions of adaptation to climate change in Makueni county, Kenya. A mixed methods approach was used that included semi-structured interviews with key informants, focus group discussions with a variety of demographic and other stakeholders groups, multi-stakeholder workshops and participatory scoring techniques. Analysis was based on framework developed by ILRI, and included assessment out at two levels: assessment of overall institutional system operating within a particular landscape and assessment of one or more particular governance mechanisms. The landscape level site for the research was identified primarily on a watershed basis but also being determined by the areas of operation of both KAMUKIMA Community Forest Association (CFA) and Ngutwa Nduenguu Water Resource Users Association (WRUA), particularly where these two organization's territories overlap. The site traverses locations of Kilala, Wote, Ukia, Nziu and Unoa in Wote district.

The most pressing challenges for adaptation to climate change in the study area boil down to four main issues which respondents consistently emphasized, and, in a scoring exercise in our first workshop with them, prioritized. Three of these relate to natural resources, were closely interconnected, and had at least some connection to watershed management and upstream-downstream interactions: availability of water, soil erosion and illegal resource use.

It was determined that KAMUKIMA CFA and Ngutwa Nduenguu WRUA were critical governance mechanisms for these issues. They were each assessed according to five criteria: legitimacy, direction, performance, accountability, and fairness. An assessment of the CFA by respondents in the research suggested that it is strongest on legitimacy and direction and weakest on accountability. Participants assessed the WRUA as being strongest on legitimacy, direction and fairness and weakest on accountability.

Assessment of the overall institutional system that is relevant to this landscape and its main challenges for climate change adaptation similarly identified accountability as a critical challenge. This can be understood in terms of capacity. Neither representatives within the local organizations—WRUA, CFA, buffer zone groups, etc.—nor community members at large sufficiently understand their rights or ways in which they could demand for accountability from those in leadership positions. Another challenge relates to institutional and organizational linkages. NGOs such as PAFRI and CESPAD have been promoting collaboration among WRUAs and between WRUAs and CFAs, and the development of a joint management plan by KAMUKIMA and Ngutwa Nduenguu is an important step. Such linkages are important in providing synergies and complementarity. However, both the CFA and the WRUA lack the necessary resources to implement the best practices in responding the issues and challenges of climate change and resource management. The required linkages to institutions that have resources, such as at county level, are very weak. There is a nominal recognition among officers in the county government that they need to work with and rely on community-level organizations such as WRUAs in order to have an impact on the ground; however, no signs of such connections being institutionalized were observed. This disconnect is a critical weakness, because it is at county level where the capacity to mobilize physical and financial resources is relatively higher and where authority for land use planning lies. This study's assessment is that many of the components needed for an effective institutional system for the middle Kaiti landscape are in place and have the potential to manage natural resources and to deliver sustainable benefits to the community, ensure the integrity of the landscape, enable the community to adapt to changing climate and enhance food security. This is a case, perhaps, of the whole being less than the sum of the parts.

Acknowledgements and disclaimer

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Acronyms

CCAFS	CGIAR Research Program on Climate Change Agriculture and Food Security
CESPAD	Centre for Social Planning and Administrative Development
CFA	Community Forest Association
FGD	Focus Group Discussion
ILRI	International Livestock Research Institute
KAMUKIMA CFA	Katende, Mutula, Kilala and Mataa Community Forest Association,
KFS	Kenya Forest Services
MCA	Member of county Assembly
NGAO	National Government Administrative Office
PAFRI	Preserve Africa Initiative
WRMA	Water Resources Management Authority
WRUA	Water Resource User Association

Introduction

Climate change affects agriculture and food production in complex ways. It affects food production directly through changes in agro-ecological conditions and indirectly by affecting growth and distribution of incomes, and thus demand for agricultural produce. Climate change will, itself, affect food yields around the world unevenly. Although some regions, mostly at mid-to-high altitude, could experience gains, many, especially sub-Saharan Africa, are likely to be adversely affected with impairment of both nutrition and incomes (Parry et al. 2007). Rural communities in Africa in particular are faced with far-reaching changes in terms not only of climate change but also population growth, economic changes, and the erosion of traditional practices and institutions. The challenge of adapting to these changes is great, with vitally important implications for livelihood and food security. A fundamental aspect of the capacity to adapt to such changes is the performance and structure of institutions, and, more generally, governance (Adger et al. 2004). Fostering effective natural resource management and governance, for example, is critical to building capacity for climate change adaptation.

The institutional environment for climate change adaptation includes not only formal government organizations and institutions, but also traditional institutions and decision-making procedures, a variety of other formal and informal organizations, and the networks and patterns of communication that connect them all. Cultural values, local norms and practices, and various sorts of formal and informal policies and procedures are also important. These factors interact in complex governance environments, where formal and informal dimensions of governance within and between sectors and levels of decision-making affect each other and ultimately the capacity of individuals, households and communities to adapt to climate change. One element in this complexity, for example, is the distribution of authority among sectoral agencies and different levels of government, each having their own systems for further structuring where, how, and by whom decisions are made. Thus decisions around management of the natural resources which farmers rely on can be split between local governments, several different national government agencies for forests, water and wildlife, and community-based organizations such as Community Forest Associations (CFAs), Water Resource Users Associations (WRUAs), and others. From the perspective a household's livelihood, or from the perspective of an ecosystem, such divisions are, of course, artificial. Sharing of information, coordination of decision-making, and the interplay among institutions are all, therefore, central to the effectiveness of an overall institutional system.

In the research program on Climate Change, Agriculture and Food Security (CCAFS), the International Livestock Research Institute (ILRI) is working to enhance local institutional capacity for supporting climate change adaptation. One way in which it is doing this is by working with local communities and other partners and stakeholders to assess those aspects of their institutional environment most relevant to the change and adaptation issues that they are facing.

The ILRI institutional assessment work has focused on institutional and governance issues affecting the adaptation of farmers and pastoralists to climate change, with a particular emphasis on governance at the landscape level. One of the sites where the methodological framework for institutional assessments has been applied was in the vicinity of Iuani in Makueni county, Kenya. This report presents the findings at that assessment.

Methodology

Analytical framework

The research approach was based on a methodology developed by ILRI for assessment of institutional and governance dimensions of climate change adaptation (Robinson et al. 2014). The framework drew on past research on environmental *governance*, in particular work by Gupta et al. (2010) and Graham et al. (2013). In the analytical framework adopted by the methodology, *governance* is not treated as synonymous with *government*. Rather, the *governance* is understood to be a set of social functions relating to collective decision-making, the resolution of trade-offs, shaping how power can be exercised, setting collective direction within a community or society, and building community. It can be carried out by governments but also by other kinds of organizations and by norms, values, networks and formal and informal institutions of various kinds. The assessments are carried out at two levels: assessments of overall institutional systems operating within a particular landscape and assessments of one or more particular governance mechanisms. Governance mechanisms are the organizations, institutions and processes which deliver governance. An institutional system is a set of *governance mechanisms* that function together, along with values, networks, and power relationships, within a social environment. Some aspects of *institutional systems* may be consciously designed, but often much of any institutional system is emergent.

The methodology is made up of five analytical tasks: initial system analysis, identification of the underlying governance issues and mechanisms of the top priority adaptation issues, identification of the most relevant policies and policy issues affecting governance and adaptation, assessment of the institutional system, and assessment of the identified governance mechanisms. The activities that were carried out for this assessment are summarized in Table I.

Table I. Conceptual tasks and main methods/activities used

Task	Methods/activities	
1. Initial system analysis	I A. Decide on level of analysis	Identified key stakeholders, initial meetings and key-informant interviews
	I B. Stakeholder analysis	Key informant interviews and focus group discussions to characterize the stakeholders
	I C. Identify and prioritize change adaptation issues	Focus group discussions, first multi-stakeholder workshop
2. Identify governance issues and mechanisms	First multi-stakeholder workshop, initial analysis by researchers	
3. Identify relevant policies and policy issues	First multi-stakeholder workshops, initial analysis by researchers	
4. Assessment of governance mechanisms	Focus group discussions, key informant interviews, participatory scoring in second multi-stakeholder workshop	
5. Assessment of the institutional system	Key informant interviews, independent scoring by researchers, harmonization of scores	

Tasks 1A, 1B, 1C and 2 were carried out in an iterative way such that identification of stakeholders helped to determine the priority issues for adaptation to climate and other changes, which in turn suggested what the critical governance issues were. This all in turn helped to determine what level of analysis with what geographic extent would be more appropriate. In this way, the initial stages of the research served to identify a landscape which corresponded to people's adaptation issues and challenges, the relevant organizations and institutions for dealing with these issues and challenges, and the key interconnections among all of these. The key considerations in delineating the relevant landscape in this case are discussed in the Description of middle Kaiti watershed section below.

Methods

Field research was conducted from August 2013 to June 2014. A mixed methods approach was used that included semi-structured interviews with key informants, focus group discussions with a variety of demographic and other stakeholders groups, multi-stakeholder workshops and participatory scoring techniques. A plan was developed detailing the activities for each stage in the institutional assessment process. The first step was to identify and classify or analyse stakeholders. Stakeholder analysis enabled the research team to know who are the most important people or groups of people, those that are relevant to the work intended to be done and those that influence social processes in a society. The research team visited the community in Wote area for a reconnaissance assessment, mainly to identify communities or institutions that shared a common natural resource as a source of livelihood, and faced similar challenges within a given landscape, where the assessment could feasibly be conducted. (See Appendix I for a summary of organizations working in the area.) These visits included identification and interviewing of potential key informants to see where these criteria would be met. A number of non-governmental organizations (NGOs) and community based organizations (CBOs) working in the area were visited and classified based on their formation and objectives/work.

Once the initial site selection was done, 8 focus group discussions were held with participants from locations within the area. These initial focus group sessions were used to identify issues and challenges for climate change adaptation and to further the stakeholder analysis. Some of the focus groups were comprised of members of particular buffer zone groups (KAMUKIMA CFA's are of operation is divided into 15 buffer zones). There were also focus groups made up of women and youth as separate groups. Two researchers facilitated the discussions on each occasion, one acting as a note-taker. On a few occasions the research team had a dedicated observer but in most of the interviews, the note-taker doubled as an observer.

Table 2. Summary of methods used

Method	Number
Key informant interviews	21
Focus group discussions (issue identification)	9
Focus group discussions (assessment of the institutional system)	
WRUA (1 women, 1 mixed)	2
CFA (1 women, 9 mixed)	10
Total	12
Focus group discussions (youth and women, various issues)	2
Multi-stakeholder workshops	2

A workshop was then held, with participants drawn mainly from members of KAMUKIMA CFA and Ngutwa Nduenguu WRUA, but also including other stakeholders. At that workshop, participatory scoring techniques were used to prioritize key issues for climate change adaptation.

Assessment of two particular governance mechanisms—KAMUKIMA CFA and Ngutwa Nduenguu WRUA—was carried out primarily at a second multi-stakeholder workshop using participatory scoring. Workshop participants were divided into stakeholder groups to each independently score the CFA or WRUA.

Assessment of the overall institutional system was based primarily on interviews key informant. Purposive sampling was used to ensure that a wide variety of perspectives were included, and interviewees included personnel from national and county government agencies, Members of the county Assembly, personnel from NGOs, representatives of KAMUKIMA CFA, Ngutwa Nduenguu WRUA and other community groups, and others. Audio recordings of interviews and focus groups were transcribed and analysed using NVivo 10 software according to sixteen dimensions of governance as specified in the assessment methodology. Two researchers each independently scored the institutional system for each of the sixteen dimensions. The scores were then compared. For 9 of the 16 criteria, the two researchers independently arrived at the same score. For the others, the scores were discussed and a consensus reached.

Description of middle Kaiti watershed

As described above, initial site selection was purposive, based on factors such as the existence of natural resource–livelihood challenges and of local level efforts to address these challenges in some way, and the willingness of local stakeholders to engage in the assessment. During initial reconnaissance visits, the research team found that CFAs could be an effective entry point to the issues and for engaging with communities. There are three CFAs in Makueni county. Two of them, however—MAKURI and Nzai/Kathonzweni—exist as little more than organization names, having nominal management committees but are not active. KAMUKIMA CFA, on the other hand, is quite active. Its members share a common natural resource: forests on hilltops. KAMUKIMA CFA's territory is composed of the Katende, Mutula, Kilala and Mataa forest blocks. The communities around these hilltop forests are involved in activities that depend on or threaten the existence of the natural resource and which in the end have an impact on their capacity to cope or adapt to climate change. The CFA has 8 registered user groups including charcoal producers associations, water user associations, firewood collection and groups, the Chemwea water project, herbalists, grazers association, resin gum harvester association and bee keepers. The CFA is also subdivided into 15 Buffer Zone groups representing the villages adjacent to the forest. These are structured as self-help groups.

The demarcation of the landscape level study area was further refined in an iterative way as analysis of climate change adaptation issues and stakeholder groups, and an initial institutional scan were carried out (Task One in the assessment methodology). This included focus group discussions to further characterize the CFA and identify key adaptation issues in the area.¹ This process made it clear that all of the main challenges for climate change adaptation had at least some connection to watershed management and upstream–downstream interactions. Another important organization that was identified was the Ngutwa Nduenguu WRUA. The WRUA's area of operation covers a 115 square kilometre portion of the watershed of Kaiti River, which traverses the Makueni county from west to east.

The hilly landscape of middle Kaiti.



1. Identification and prioritization of climate change adaptation issues is discussed in greater detail in the Institutional and climate change adaptation issues at middle Kaiti section below.

Hills, including those where KAMUKIMA CFA operates, form the catchment zones for the watershed. Hence, the landscape level site for the research finally demarcated primarily on a watershed basis but also being determined by the areas of operation of both KAMUKIMA CFA and Ngutwa Nduenguu WRUA, particularly where these two organization's territories overlap. The site traverses locations of Kilala, Wote, Ukia, Nziu and Unoa in Wote district.

The landscape is mostly a valley terrain with hills to the southwest and the northeast (where KAMUKIMA operates) with two major seasonal rivers: Kaiti and its tributary the Muinga River. The two main natural resources available at the valley bottom are the water and the sand on the river basin. The upper, hilltop part of the landscape is endowed with many species of wildlife including small wild mammals, reptiles and birds and has many shrines and camping sites. People practice small scale mixed, crop/livestock farming.

Institutional and climate change adaptation issues at middle Kaiti

CCA issues at the study site

After initial reconnaissance including a handful of meetings with selected government and NGO personnel and CFA representatives, focus group discussions and key informant interviews were conducted to collect information on key adaptation challenges and issues. For the focus group discussions eight (8) buffer zones were sampled from the fifteen (15) that make up KAMUKIMA CFA. Respondent selection was stratified by buffer zones and then choosing the participants for the focus groups based on gender, level of education and perceived level of participation in CFA activities. In cases where the random sample did not have a representation by women, we purposefully selected a female representative. In the community, youth are culturally restricted from saying some issues before older men. This necessitated interviewing the youth separately.

The guide prepared for the focus group discussions included questions exploring people's knowledge of changes in weather patterns and activities associated with those changes. Some of the climate change issues identified include the following:

- Lack of water—Every focus group mentioned lack of water as the key climate change issue. Most of the respondents said there used to be water in the rivers/creeks and wells. The area used to have both seasonal and permanent rivers. The situation has changed in the recent past with most of the rivers that were permanent now becoming seasonal. They attribute the change to many reasons including the change of land use practices. About 20% of the respondents did not identify any connection between lack of water with anthropogenic activities.
- Soil erosion—In recent times, people have experienced huge amounts of soil erosion on their land, particularly those on the hills sides. The erosion is by wind during the dry seasons and storm water whenever it rains. This has left most of their land poor in nutrients and therefore low crop yields. Gully erosion is also a problem.
- Unreliable rainfall—The respondents provided an historical timeline in rainfall variations. Before 1980, the rainfall was regular and predictable, but since the 1980s, the rains have diminished with prolonged periods of drought. Respondents state that it is hard to predict the rainfall in the area nowadays. This makes it hard for the farmers to plan their agricultural production programs, with most of them losing total investments whenever they fail to predict properly.
- Illegal resource use—Participants identified the illegal use of resources and the inability to enforce rules around natural resource harvesting—particularly illegal felling of trees and sand harvesting—as important problems contributing to resource degradation.
- Forest fires—Forest fires have become more common during the dry seasons. Most are usually accidental but once they start, they cause huge losses. Reforestation efforts that have been going on in the area to mitigate the negative impacts of weather variation are frustrated by these fires.

- Pests, diseases, and post-harvest storage—These were mentioned by some of the focus groups.
- Infrastructure and market access—The poor state of infrastructure, especially roads, constrains market opportunities and hinders people’s ability to cope. This is a big challenge higher up in the hills in that when rains are heavy the roads can become completely impassable.
- Social consequences—The problems have, in turn, caused social problems including stress and suspected impacts on mental health. The livelihoods of many households have been destroyed by among other calamities, the forest fires. Young men who are supposed to be productive in the community have resorted to drugs or are depressed because of lack of livelihoods.

Underlying governance issues

From key informant interviews and focus group discussions, a number of issues affecting the community’s ability to adapt to change and to address the above-mentioned challenges were identified. When respondents identified some particular challenge for adaptation, they were asked why they have not been able to address the problem. The responses often touched on governance. The following is a summary of the issues identified:

- Lack of or low learning capacity—Most community members said they may not be aware what their limitations to adapting to climate/weather variations are. Key informants stated that most people have a low level of formal education and low ability to use technological innovations for adaptation. For example in Luani, the buffer zone representatives said ‘our biggest problem is water. If we have sand dams, we may not need to sell sand, we will preserve the river bed. But now, we do not know how to construct the sand dams.’
- Failure of responsible government institutions to provide the required state support.
- Illegal and unsustainable resource extraction—The main natural resource in the area is the forest on the hills. The community members have access to the forest for purposes of timber harvesting.
- Lack of sub-catchment management plans—When the landscape is poorly planned, utilization of resources is random and disorganized. The respondents said the community members would not use their land properly since there was no properly spelt out management plan. As a result, there was excessive erosion and forest degradation in the area.
- Poor leadership at local and national levels.
- Lack of transfer of traditional ecological knowledge—Traditionally people knew a lot about the trends of weather patterns and what needed to be done on every season. They had traditional skills and knowledge that flowed informally from generation to generation. Such knowledge helped people reduce their vulnerability to risks related to adverse weather. Such knowledge is not in the community any more. With the advent of modern, formal education, traditional ecological knowledge disappeared.
- Lack of effective authority for regulation—Most of the respondents said they know what the remedy to some environmental degradation would be but they do not have the power to set and enforce regulations.

Verification and prioritization—First workshop

At the first multi-stakeholder workshop, issues identified in focus groups and key informant interviews were written on cards and clustered by workshop participants in a participatory manner. The six main clusters were then prioritized by workshop participants through a voting exercise according to how important and pressing they judge each issue to be. During the voting process participants were advised to vote based on their knowledge and understanding of issues. Each participant was given 3 votes to distribute among the issues according to how important they viewed those issues. The results are summarized in Table 3.

Table 3. Prioritization of adaptation issues

Adaptation issue	Total votes	Percentage
Infrastructure and market access	22 votes	20%
Water availability	33 votes	30%
Illegal resource use	22 votes	20%
Post-harvest storage	0 votes	
Pests and diseases	2 votes	1.8%
Soil erosion	31 votes	28%

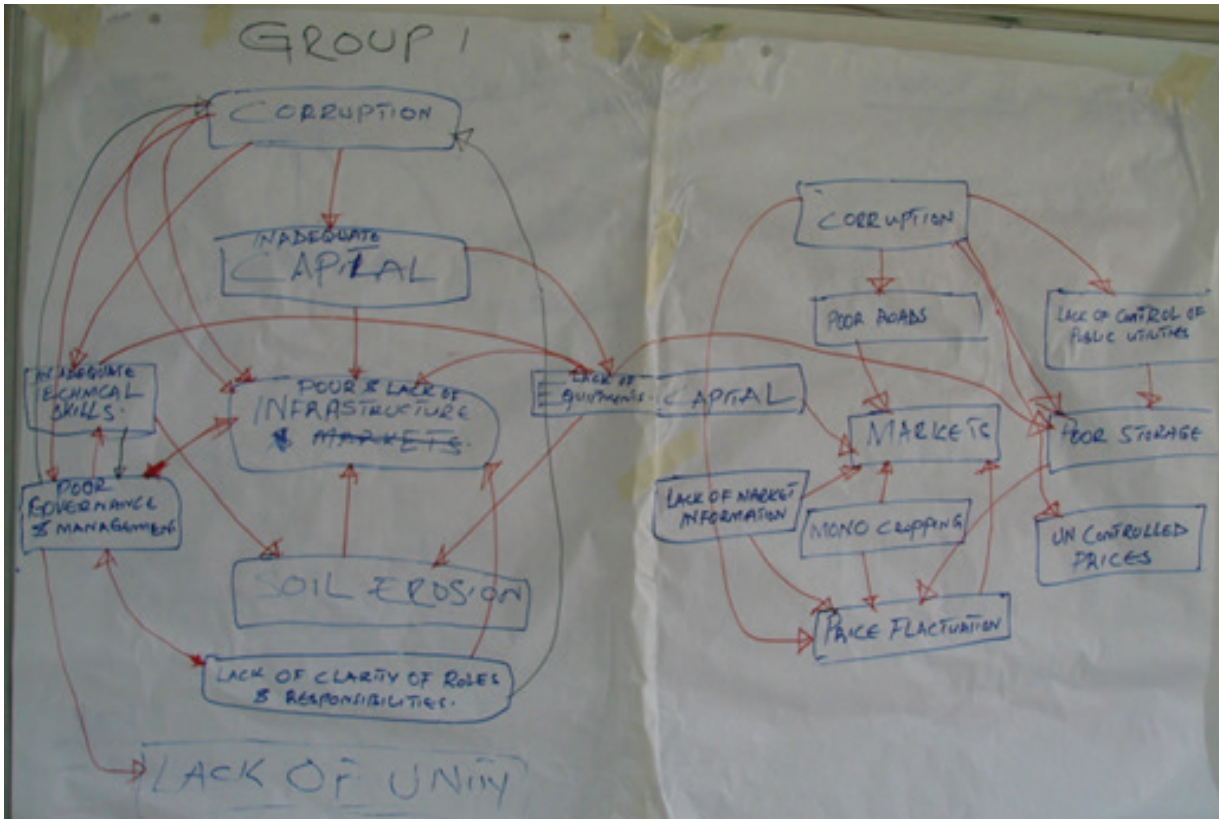
The most important issues were then discussed in breakout groups. These activities also served the purpose of validation, as the workshop discussions mostly confirmed what had been discussed in focus group discussions. Participants in the breakout groups also engaged in analysis of the issues through the construction of influence diagrams (Figure 1). Institutional and governance dimensions of the top four prioritized adaptation issues were also discussed (Table 4).

Table 4. Governance issues associated with the prioritized adaptation issues

Adaptation issue	Governance issues
Infrastructure and market access	Corruption Lack of control of public utilities Lack Capital Lack of clarity of roles and responsibilities (esp. with regards to devolution)
Water availability	Poor leadership Corruption Controls on harvesting Resource mobilization
Illegal resource use	Poor use of resources Enforcement of rules on harvesting
Soil erosion	Policy on title and inheritance of land Land use policy generally Subdivision of land Capacity of government technical officers

Figure 1. Influence diagrams from the first multi-stakeholder workshop.





Based on these results and information gathered from the preliminary stage of the research, two main governance mechanisms were identified for the assessment:

- KAMUKIMA Community Forest Association
- Ngutwa Nduenguu Water Resource User Association.

Other relevant governance mechanisms included the Forest Management Plan, the Kaiti Watershed Integrated Management Plan Sub Catchment Management Plan and the county Spatial Planning procedures.

Assessment of selected governance mechanisms

At the second multi-stakeholder workshop, participants were divided into breakout groups according to their organizational affiliation to assess KAMUKIMA CFA and Ngutwa Nduenguu WRUA according to five criteria: legitimacy, direction, performance, accountability and fairness. A simple scoring criteria was devised and agreed upon by the participants. The scores ranged from negative two (–2) to positive two (+2). Members of KAMUKIMA CFA and Ngutwa Nduenguu WRUA each did self-assessments while the other participants not belonging to either of these two organizations—mostly government and NGO personnel—assessed both. Each of the five criteria are discussed below based on discussions at the workshop, but also enriched by comments made during focus group discussions and key informant interviews that were conducted prior to the workshop.

Legitimacy

The researchers sought to know if KAMUKIMA CFA and Ngutwa Nduenguu WRUA were widely understood and accepted by the stakeholders/community members and if they appropriately address people’s needs while respecting the local cultural norms.

The CFAs are established based on the Kenya Forestry Act 2005, which gives communities an opportunity to take part in the management of the state owned resources, the forest. Members of the CFA and the community around them demonstrated their knowledge of the existence and functions of the organization. They are actively involved in the routine activities of the CFA. The youth in the CFA areas know about the CFA but are not actively involved. The women and the men understand the operations of the CFA and can positively identify with it. They know that the activities of the organization are responding to the environmental degradation issues that affect their livelihoods directly. The organization has a sound legal foundation. It was established as per a government policy on forest management. The CFA, by its nature and formation, gives room for all the members to participate in decision making processes. However, women and youth have limited contribution in making decisions affecting the running of the CFA and hence management of the resources. They have a legal recognition at the forestry department and are also registered as a local CBO.

On the other hand, the Ngutwa Nduenguu WRUA is an organization that was formed and registered and the Water Act (2002, amended in 2012) and is well recognized, and appreciated by the members. The WRUA is an association mandated to serve the interests of water resource users in a subcatchment/subbasin area as per rules stipulated in the act and enforced by the subcatchment area Management Board. The rules for the management of the WRUA are set by the Water Resource Regulatory Authority or the Water Resource Management Authority (WRMA). This gives the Ngutwa Nduenguu WRUA a clear definition of purpose and an appropriate legal standing. Members of the WRUA are continuously involved in activities of the WRUA including meeting to deliberate on processes and major milestones.

The leadership is composed of a committee that is democratically elected. People in the area and government authorities in addition to WRMA and the Ministry of Water and Irrigation recognize the WRUA and their work in the area. All the members and leaders who were interviewed understand the WRUA as a vehicle for responding to the adverse effects of changing environmental conditions.

For both the WRUA and the CFA, it was clear from the discussions that the organization has the required legitimacy to operate in the area but it was hard to evaluate some elements including the process of electing leaders. The cultural barriers seem to be in play hence leading to the election or selection of some people who are thought to be opinion leaders even when they do not have the required skills. Neither organization has had any major transition in leaders.

Direction

The CFA has a forest management plan that spells out the roles of the organization for its members. In the management plan, the roles of the CFA include enhancing the ability of people to realize their potential to adapt to changing climate or cope with the adverse conditions as a result of climate change. While the management of the organization has been trained on how to run the activities of the CFA in a way that can support their members, only a few understand or follow the guidelines provided in the management plan. Most of the leaders interviewed seem to have forgotten the details of the plan and therefore do not positively identify with it. This would mean they may have tried practicing or operationalizing the training. More than 50% of the people interviewed seemed to know what is required of the CFA in supporting the members but highly doubted if the CFA is actually doing the same. The older men respondents seemed to agree they can trust the CFA leadership to deliver benefits including training on how to adapt to changing environment. Older women have respect and trust the CFA leaders and feel they know how to guide them to the right direction. The youth agree with the principle of the CFA but do not agree with the style of leadership. They feel the leaders do not use the right strategies and it would be better if they were included in the leadership. Three of the five middle-aged key informants (men) said they have confidence in the management structure but doubted the ability of some of the committee members. They propose a faster adoption of appropriate technology including energy stoves, making and use of briquettes, generation of biogas among other climate smart interventions. The Kenya Forest Service, a government body that is mandated with conserving forests feel the CFA is a good link between them and the community where forest resources exist. In many occasions, the forest conservator referred to the CFA as their eyes on the ground and that they are there to complement their work.

Since inception the WRUA has been operating on the direction provided by the water regulatory authority and the community aspirations to achieve sustainable water supply for their livestock and irrigation. The Water Resources Management Authority (WRMA) facilitated the capacity building of the WRUA in areas of identifying the key issues and solutions to challenges associated with their water resources. For the last three years, the WRUA has been trying to bring the community together in order to use a common strategy to reduce threats to their water resources. They have assisted the members to learn how they can tackle common problems like planting trees on their land adjacent to river basin to protect it from erosion. A common goal of minimizing or stopping unsustainable sand harvesting from the river basin has been in place and WRUA members seem to respect that. However, the challenges facing the WRUA suggest that more needs to be done to strengthen the focus of the WRUA. Community members suggest more training to enhance their understanding of various modern strategies on mitigation and adaptation to climate change. While training has been provided, particularly on the running of an organization, most committee members may not have the required capacity to learn. It may be necessary to sensitize the members on what the requirements of the committee may be before they can conduct an election. There should be regular annual general meetings to allow for election of fresh members or re-election of those that prove capable of meeting the leadership goals.

Performance

The performance of both the CFA and WRUA as governance mechanisms was assessed. The CFA, since its formation has achieved various kinds of support including the community members' training on tree planting on their land, planting of fruit trees (agroforestry), beekeeping and making of rascal and regular terraces on their hilly land. Upon its formation, the CFA with support from an NGO operating in the area acquired funding to conduct training for the members on tree planting, tree nursery preparation, bee keeping and fruit growing. The tree nurseries were for fruit and forest trees. So far, there is evidence of afforestation on every member's land. Eco-enterprises including beekeeping and honey production and marketing are also ongoing on a few farmers' farms. Ngutwa Nduenguu WRUA has been able to mobilize community members to form the organization, register it and has encouraged people to carry out minimal activities aimed at protecting the water catchment area. The WRUA has been funded by the Water Resources Management Authority (WRMA) to conduct capacity training activities for the members. Individual members have been encouraged to use the various interventions on their own lands.

Accountability

Accountability generally refers to public process of evaluation and record-keeping through which members can make corporations/organizations and governments answerable to them.

While legislation and regulations lay out some guidelines for ensuring accountability within CFAs, at our study site, the understanding and capacity of the members for creating effective accountability procedures is low. The community members have not been empowered to participate in any detailed process to ensure the tools and process for reporting takes care of their interests. Although the leaders interviewed said they have records, most of them did not seem to know where they are kept. The leaders feel they are operating in a transparent manner but some members say they are not aware of how some things are done. They have not been accessing the records if at all they exist. The leaders do not have detailed records of finance related transactions. Meeting minutes are not kept all the time and whenever they are taken, they may not be accessed in the next meeting. The leaders feel they have been implementing activities impartially. Some members feel more should be done to ensure impartiality in the CFA's activities. Since the activities are done on individual land, partiality may not be practiced.

The CFA does not have a lot of financial resources. Whatever little funds they get from donor agencies, are usually for a specific activity, such as travel and are spent without formal accounting. The CFA is supposed to mobilize resources from members and outside agencies including government. It is hard to establish whether this is happening since there are no records and most reports are verbal. There are no records for a grant that the CFA received from Community Development Trust in 2008. The project activities closed down in 2008 when the funding ended. Ideally, there should have been records and reports for the project.

The Ngutwa Nduenguu WRUA demonstrates a good degree of accountability to the members and to the WRMA. The members, including women and youth understand their rights and participate in activities and processes that enhance exercising their rights in an open and equitable manner. The members have received training from PAFRI on how to participate in and what to expect from the WRUA processes. There are regular meetings between the WRUA officials and the member groups. From these meetings, minutes are taken and can be accessed whenever needed. Most of the leaders of the WRUA are fairly educated and more youthful. They understand basic principles of running an organization like this and they understand they are accountable to the members and society. The WRUA has not had much financial resources to report on or to account for as they have been in operation for only two years.

Fairness

Fairness is achieved when a community or social process treats all the stakeholders in the same manner. It is often complex to assess fair treatment especially where people are receiving services only as opposed to where goods are involved. Rural and indigenous communities have a way of ensuring impartial treatment of subjects. Much of this is in play in the communities in Makueni. The KAMUKIMA CFA is designed to operate in a way that will ensure equal benefits to all members. The executive committee ensured equal distribution of services and resources so far. For example, beehives were given equally to all buffer zones. Since communication is mostly by word of mouth, information is sent to all members in all the buffer zones. However, some community members feel they are not treated equally. Community members have been appropriately mobilized to take part in the activities of the CFA. This is not very successful as some members are not contributing appropriately to most of the required social costs. Scouting or supporting Kenya Forest Service (KFS) rangers in tackling issues like illegal harvesting of forest products and putting off forest fires when they happen are some of the activities that require community input. Most of the community members do not have the inspiration to participate since they do not associate their input with any benefits they receive. A cross section of the members still think that should be a state/government function and if they participate, they should be directly compensated.

Ngutwa Nduenguu WRUA, just like the CFA has provisions for equitable distribution of benefits and costs amongst members. The fact that most of the activities taking place are on individuals' farms enhances the achievement of equal distribution of ecosystem benefits. The funds that have been received so far were meant to mobilize and capacity-build the members. All organization members received the training as required. Members also contribute their time whenever there is a group activity taking place. This young organization has potential for achieving high level of fair distribution of benefits and costs, which will enhance the people's ability to cope with climate variability.

Overview

A summary of the scoring done at the second workshop is presented in Tables 5 and 6.

The participants recorded comments as well. The remarks show that the overall governance at this landscape level is weak in most of the criteria. The most common recommendations across the groups include institution of a proper accountability system, provision of appropriate training, provision of funds to conduct activities and training or capacity building of the members.

Table 5. Summary of participants' assessment of KAMUKIMA CFA

Criteria	Scores given by breakout groups	
	Group 1 (NGO and government personnel)	Group 4 (CFA members)
Legitimacy		
Is the institution understood and accepted by people?	N/A ¹	+2
Does the institution have legal foundation?	N/A	+2
Do people know that the institution exists?	N/A	+2
Direction		
Are roles and functions clear and well understood?	N/A	+2
Does the group provide direction to the members?	N/A	+2
Performance		
Is the mechanism effective? Does it achieve its objectives?	+1	+1
Is the mechanism efficient? Does it achieve those objectives in a cost-effective way?	+1	0
Is the mechanism responsive to stakeholder needs and opinions?	+1	+2
Accountability		
Are roles, responsibilities and lines of accountability clearly defined in relation to the mechanism?	-1	+1
	0	+2
Does the mechanism function in a way that is transparent to stakeholders?	0	0
Do stakeholders understand their rights with regard the mechanism, and are they empowered to assert those rights?		
Fairness		
Is institution implemented impartially?	0	+1
Does it favour one particular group in the community?	+1	+1

1. Some criteria were not assessed by some breakout groups because of lack of time.

Table 6. Summary of participants' assessment of Ngutwa Nduenguu WRUA

Criteria	Scores given by breakout groups		
	Group 1 (NGO and government personnel)	Group 2 (WRUA members)	Group 3 (WRUA members)
Legitimacy			
Is the institution understood and accepted by people?	+1	+1	+1
Does the institution have legal foundation?	+1	-1	+1
Do people know that the institution exists?	+1	+2	+2
Direction			
Are roles and functions clear and well understood?	+1	+2	+1
Does the group provide direction to the members?	+1	+1	0
Performance			
Is the mechanism effective? Does it achieve its objectives?	+1	+1	-1
Is the mechanism efficient? Does it achieve those objectives in a cost-effective way?	+1	+1	-2
Is the mechanism responsive to stakeholder needs and opinions?	+1	+1	+2
Accountability			
Are roles, responsibilities and lines of accountability clearly defined in relation to the mechanism?	+1	-1	-2
Does the mechanism function in a way that is transparent to stakeholders?	0	+1	-1
Do stakeholders understand their rights with regard the mechanism, and are they empowered to assert those rights?	+1	-1	-1
Fairness			
Is institution implemented impartially?	+1	+1	+2
Does it favour one particular group in the community?	+1	+2	N/A

Assessment of the overall institutional system

Based on our delineation of the landscape being studied (see Methods section above), we identified the various organizations, institutions and other elements making up the institutional system that corresponds to that landscape and the issues of concern. This was found to include KAMUKIMA CFA, Ngutwa Nduenguu WRUA, Members of the county Assembly, and the National Government Administrative Office (formerly Provincial Administration). Departments and agencies of the national and county governments and NGOs also play important roles. Based on the interconnected natural resource management issues which respondents identified as top priority challenges for climate change adaptation, this study devoted particular attention to the WRUA, the CFA and the county land use planning process which were just getting underway.

The institutional system was assessed according to eight main dimensions: the ability to generate resources, room for autonomous change, variety, promotion and development of leadership, learning capacity, institutional linkages, fair governance, and effective decision-making. Overall, the assessment aimed at understanding ways in which the institutional system promotes, or hinders, the enhancement of capacity for adaptation to climate change. In the following sections we provide a detailed assessment of the institutional system according to the 8 main criteria and 16 subcriteria.

Learning capacity

Deliberation

Whether the institutional systems allows adequate space for dialogue, deliberation and analysis

Within the WRUA and the CFA, there are opportunities for deliberation and dialogue both at the level of the executives and also among the representatives of the user groups or buffer zone associations which make up the respective organizations. At higher levels, the forums and networks which have recently been formed have created numerous opportunities for deliberation, particularly among WRUAs and between CFAs and WRUAs. PAFRI and CESPAD, in collaboration with WRMA and other agencies, have put a great deal of emphasis bringing the CFAs and WRUAs together to discuss problems, share ideas and concerns, and gradually work toward coordinated action. How well these opportunities for deliberation and collective analysis and problem solving extend down to the grassroots level is less clear. The people who participate through the user groups and buffer zone associations in the activities and decision-making of the WRUA and CFA, respectively, are activists and leaders. Comments from our respondents suggested that more work is needed to involve community members at large in the deliberation and planning that are part of WRUA and CFA activities.

Trust

Presence of institutional patterns that promote mutual respect and trust

In the recent past, there was some lurking mistrust between the CFA and the WRUA, according to some respondents more so here than elsewhere in Makueni. The collaborative discussions and joint planning activities, however, have been gradually building up trust between them and also with organizations such as PAFRI. They are now working together constructively. Relations between the WRUA and WRMA are also positive. However, trust between the community-based organizations and other government agencies and their personnel is still not strong. For example, opinions about the capacity of WRUAs and CFAs among government technical staff vary, but on the whole express a low opinion of the capacity of these organizations. This lingering mistrust goes the other way as well. The relationship between KFS and the CFAs is a case in point: the slowness of KFS to empower the CFAs for management of forest resources has deepened community mistrust of KFS.

Trust

So I must say the initial meetings were not that easy, because I realized some people in WRUA didn't understand what CFAs are, some people in CFAs didn't understand what WRUAs are, then they were blaming each other, some were saying the people in CFA are the ones who destroyed the catchment.

- An NGO leader

The communication [between the CFA and the WRUA] has been quite okay. We had a workshop together and made a PIC—Project Implementation Committee—which is drafting the management plan for the WRUA and CFA CFA used to work alone and WRUA alone but this time round now is when we want to work together because, WRUA cannot work without CFA.

- An executive of KAMUKIMA CFA

Use of diverse types and sources of knowledge

Whether the institutional system makes use of diverse types and sources of knowledge

Most of the respondents who commented on this issue suggested that different types of knowledge are available, but suggested that the linkages for sharing that knowledge do not seem to be in place. Respondents involved in community-based organizations for natural resources management (the CFA and the WRUAs) mentioned the need for research and technical knowledge, and that they seem not to get access to the right knowledgeable people. Other respondents commented how in the past decisions have been made without consultation, including without consultation with the appropriate technical persons in government technical departments. Under the new constitution, with more important decisions now being made in the county Assemblies, this consultation and information flow seem still to be weak.

Institutional memory

Institutional provision of monitoring and evaluation processes of policy experiences

At the county level, there are procedures for monitoring and evaluating the policy processes. In the previous provincial/national government, development plans included a logical framework spelling out objectives, activities and outcomes that could be monitored or evaluated. That system has been inherited by the new county governments with more powers given to the Members of the county Assembly (MCAs) in making decisions and monitoring the implementation. At the community level however, the CFA and the WRUA have not demonstrated an elaborate system of planning and implementation that can be monitored or evaluated without consulting the leaders. There are no project planning documents or logical framework that can be independently audited to establish what has been

happening. The capacity building and facilitation work that PAFRI is carrying out is helping to put in place a system that enhances institutional memory. For example, the integrated resource management plan which links the operations of the WRUA with those of the CFA and the county government will allow for evaluation of policy interventions.

Variety

If the institutional system facilitates the involvement of diverse perspectives and pursuit of diverse solutions.

The institutional system in the landscape allows for different perspectives of opinion to be tried in trying to deal with issues affecting the community. A number of NGOs offering different services and products have been allowed to work in the community over time. However, issues touching on water and forest resources are regulated by the WRMA and KFS respectively. The CFA allows for the individual members to try different interventions on their lands without interference. Women groups in the CFA region have been trying a number of new innovations in upgrading their local chicken and dairy breeds to increase productivity and food security. In trying to mitigate land degradation, tree planting and establishment of nurseries is advocated for by the CFA leaders. However, the members are free to try different species of fruit trees on their land.

The WRUA has room for trying new and diverse strategies in enhancing member livelihoods in the face of climate variations.

Variety

For example, if they say that they would like to have beehives in the forest and they don't have the knowledge neither trained, they don't have the clothes, the smokers, you expect them by the time they are harvesting their honey to cause problem with an outbreak of fire and that causes an alarm, therefore we cannot allow that.

- Chairman of CFA

Room for autonomous change

Whether actors are given scope for experimentation

Based on the nature of the system, stakeholder organizations have little control over the actions of individuals. Individuals have a free hand in trying new ideas and innovations on their own but there are instances where the organizations give guidance on the new innovations or ideas that need to be adopted.

The CFA structure allows for the buffer zones and the individual members to experiment on their farms but the CFA does not have similar autonomy to try out new ideas without consulting the government institution responsible, the KFS.

Leadership

The institutional system fosters the emergence of leaders and champions, of different types, within its various communities, sectors and stakeholder groups.

A few different organizations—WRMA and PAFRI, for instance—have done capacity building for local leaders, which has been helpful. Generally, however, while new initiatives from emerging local leaders seem not to be opposed, neither do the key organizations go out of their way to foster emerging leadership. The local leaders such as in the CBOs for community-based resource management, tend to be drawn from local elite, with little attempt to incorporate and support potential leaders from other segments of the community.

Institutional linkages

The presence of appropriate linkages among organizations and institutions

Some important institutional linkages exist within the organizations in the system but communication is not very effective among the stakeholders. For example the WRUA members understand little about what the CFA members are doing. In the past, they have blamed each other for failure to implement actions that would have benefited the community. With the new county system, coupled with the efforts to integrate activities by PAFRI, the situation is improving. For example, there is an understanding and agreement that river catchment includes forest land and rivers and therefore the different statutory provisions guiding the use of the forest and water resources require harmonization. The CFA and WRUA have good linkages with the NGO PAFRI, KFS, and WRMA. There seems not to be a strong link between KFS and WRMA and the NGOs. Other NGOs and development agencies working in the area such as the United States Agency for International Development (USAID), Heifer International and Anglican Development Services have very weak linkages with the CFAs and WRUA in Kaiti watershed.

While, in the recent past, there has been some mistrust particularly between the CFA and the WRUA, through various recent initiatives information sharing and coordination amongst WRUAs and CFAs have been improving.

With the exception of linkages between KFS and the CFA and between WRMA and the WRUAs, institutional and organizational linkages between county and national government stakeholders on the one hand and these community-based structures on the other remain very weak. While some respondents in county government expressed the importance of CFAs and WRUAs, there is little that has been done thus far to include them in the county's planning processes or in the implementation of the plans.

Institutional linkages

On the side of collaboration between the major stake holders i.e. WRUAs, NEMA, Provincial administration, NGOs, CFAs and KFS at the time we are collaborating very well on the issue of tree poaching because we are within

- KFS conservator

Resources

Authority

Provision of accepted or legitimate forms of power that provides the institutional system with authority to act; whether or not institutional rules are embedded in constitutional laws. Includes 'political resources': support for the institutional system from the political realm.

The institutional system has limited authority or legitimate forms of power required to provide it with the authority to act. Part of this is a result, particularly in the case of the relationship between KFS and CFAs, of an unwillingness to cede authority to lower levels. The CFA has an agreement in place with KFS but KFS has been slow to implement it. Certain activities require action on the land, and this necessitates seeking buy-in from the landowners—their members. The CFA and the WRUA aim at implementing interventions on individuals' land, as there are few common property resources. However, the CFAs and WRUAs have a legal recognition. They are both established by acts of parliament and are appropriately registered. Their ability to raise financial resources for the implementation of their mandate is very limited. The system has been able to mobilize human resources to undertake activities at the community (WRUA/CFA) level. Both the WRUA and CFA have been able to link themselves up with agencies with special skills for capacity building like PAFRI. However, they have not been able to mobilize human resources for long term activities, even from their own people with such skills. Locally, the organizations do not have skills to fund raise and therefore depend on consultants, particularly on occasions where the donor is providing finances to pay for consultant time. The county government (and its predecessor the provincial/central government) has some limited

ability to mobilize and access funds. Under the previous constitution, the local CBOs did not appropriately benefit from the financial and human resources provided by the government. In the current system there is a general feeling that things may be better.

Human resources

The institutional system is able to mobilize expertise, knowledge and human labour

The communities have not been able to appropriately mobilize and utilize the required technical human resources. The lack of a reward system that can attract and retain human expertise is a big hindrance. Young people from the area who get educated and trained at higher levels of learning get jobs elsewhere and are not willing to come work for the community mainly due to lack of finances and opportunities for personal growth. The system is however endowed with the required human labour to implement adaptation interventions. The community members are always willing to provide labour sometimes for free or at a very low wage. For example, the CFA members have volunteered as scouts to police the community forest, put off forest fires and do anti-poaching patrols for free. The WRUA members also provide free labour on sand dam construction or building of shallow wells that benefit the community.

Financial resources

The institutional system is able to mobilize financial resources to support policy measures and financial incentives

The organizations in the system have varied levels of ability to raise the required finances for their work. The county government is able to raise a budget for natural resources development in the county. The county government system through the MCAs can incorporate the activities of the CFAs and WRUAs in their budget through the participatory annual budget processes. However, this has not been appropriately coordinated, mainly due to the fact that the system is new. The CFA and WRUA lack the ability to raise funds from sources other than the government.

They require support to enhance the building of the technical skills required for raising funds, management and accounting for it.

Fair governance

Legitimacy

Whether there is public support for the institutional system

The degree of legitimacy was a big challenge in the early days of the CFA and WRUA, but they have steadily been gaining acceptance by community members at large. The sense of ownership of these organizations and their plans, however, remains weak.

Equity

Whether or not institutional system is inclusive and its rules are fair

For the key organizations and institutions within the system, the structures and procedural rules are fair. In devising the rules for use of natural resources there seems to have been a deliberate effort to have appropriate representation in the organizations management committees. Women are included in the committees. The CFA has not managed to include the youth in their committees. The youth feel the older men have sidelined them while the older men claim the youth are just lazy and do not want to take responsibilities. On the whole, there is little effort by those in

leadership position to uplift the level of understanding of those without such capacity, to know their rights and hence take part in the decision-making process. Greater effort must be made to proactively improve inclusivity: youth, women and the poorest are still not well represented.

Accountability

Whether or not institutional patterns provide accountability procedures

The county government and the Ngutwa Nduenguu WRUA are fairly new. The CFA has been in operation for a few years but it was not easy to assess accountability for resources they have accessed so far. While the leadership say they keep records of all the events and transactions, the members do not confess being in a position to query or audit anything. There are regular meetings by committee members but the minutes do not get presented to the members regularly. Most members have a low capacity to understand all the necessary procedures of holding the leadership accountable for their actions and resources. The WRUA on the other hand has a fairly educated membership and leadership, and have accessible records. A challenge in this area seems to be the capacity for accountability—community members neither understand their rights well, nor the responsibilities of their representatives in the CFA or WRUA, nor how to hold them accountable. The challenge of accountability appears to be one primarily of the capacity to hold representatives and the relevant organizations accountable. Neither community members nor the representatives themselves have strong ideas of what community members' rights in relation to the organizations are, or the kinds of procedures to institute which could ensure accountability. The only obvious moment for accountability is when representatives for these bodies are periodically selected.

Financial resources

One reason why we have really had no great impact is because of lack of resources, we do almost on voluntary basis...

- Chief, luani

Responsiveness

Whether or not institutional patterns show response to society

Institutional linkages up to county level, together with the fact that the Governor and MCAs are directly elected, have created a certain degree of responsiveness. However, at community and landscape levels, as the institutional system is very new, there has been little experience upon which the responsiveness of the system at those levels can be assessed. It is clear that responsiveness is hampered by lack of funds. It is still early to assess the responsiveness of the system to people's needs but generally is not strong. The KFS have their officers (rangers) on the ground but it is reported some problems requiring their interventions have not been appropriately coordinated. The CFA members have had to battle a few instances of forest fires alone. The KFS say they are not well resourced to respond as required to community needs like putting out forest fires and dealing with illegal harvesting of forest (timber and non-timber) resources.

Effective decision-making

Efficiency and effectiveness of decision-making processes themselves

The institutional system sets clear scope, goals and objectives for actors, is efficient (does not spend disproportionate time and resources producing decisions, and fits the social-ecological system (is adapted to spatial, temporal and other characteristics of the social and ecological environment).

The existence of shared visions and a clear scope, goals and objectives for key decision-making bodies within the institutional system is somewhat lacking, in part because of the weakness of institutional linkages. While the situation has been changing, the key players are often working at cross purposes and shared direction has not been established. The community members, the community based organizations, the county government and other development agencies have structures for decision making, mainly community meetings (Barrazas) and seminars. Some deliberation and consensus building with community members take place but mostly, the organization management or government representatives inform the people on what has been decided. The WRUA and the CFA provide good ground for deliberation at the community level. At the higher level, collaborative decision making takes place where the organizations have been assisted to network. There is a platform and goodwill for collaboration in planning processes but at present the organizations are not communicating appropriately.

At the community level, members have been mobilized and trained to undertake sustainable activities. Evidence from the KAMUKIMA CFA show that some of the activities and eco-enterprises have not only uplifted community livelihoods but also in the processes of restoring derelict landscapes. The members of the WRUA have initiated activities aimed at restoring the degraded river banks and increasing availability of water during the long dry spells. Decision-making processes within the landscape seem to be relatively efficient, although are constrained by insufficient experience and capacity and lack of access to technical knowledge.

Overview

Two researchers each independently scored the institutional system for the 16 governance criteria, after which the resulting scores were discussed. From the independent scoring, the researchers arrived at identical scores for nine out of the sixteen criteria. The scores were discussed and for the other scores a consensus was reached. The table below provides the agreed score and a summary of the comments.

The criteria which scored weakest were accountability, responsiveness, ability to generate resources, learning capacity and leadership.

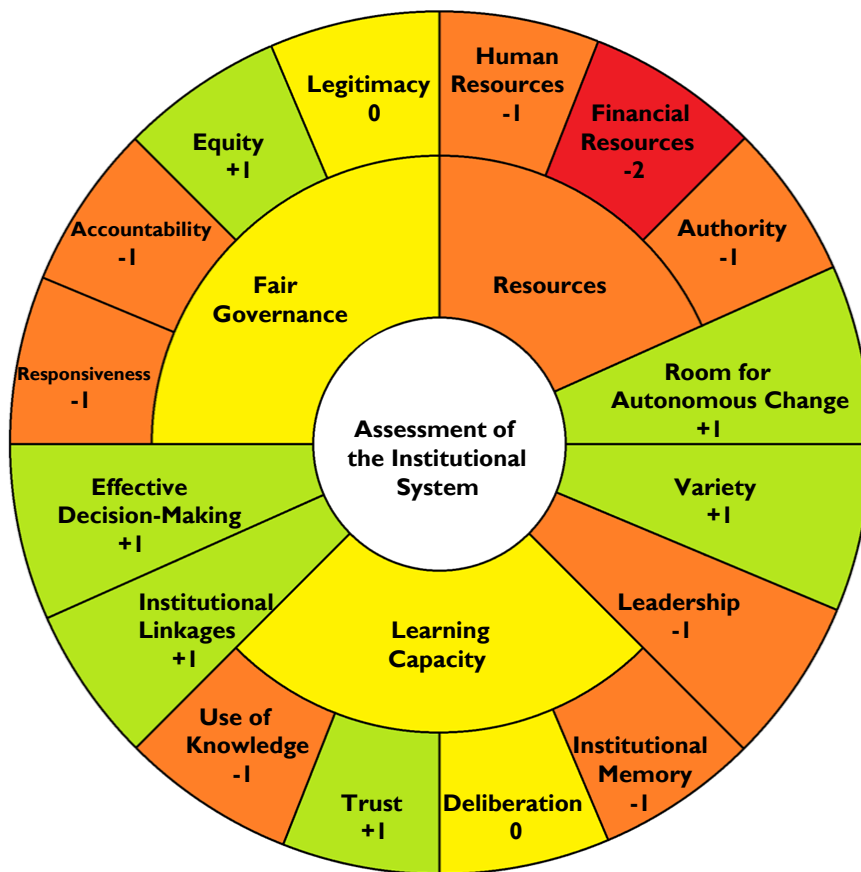
Table 7. Institutional assessment—Summary

Criteria		Assessment	
		Score (-2 to 2)	Comments
Variety	1. Does the ISI system facilitates the involvement of diverse perspectives and the pursuit of diverse solutions?	+1	The institutional system allows for different perspectives to be considered in trying to deal with issues affecting the community. Innovations in organizational patterns are being embraced by most stakeholders. However, there is no clarity on sharing or cooperation among key stakeholders
Learning capacity	2. Does the IS promote trust among various communities and stakeholder groups?	+1	Recent collaboration among the CFA, the WRUA, and other stakeholders have gone a long way to build up trust. In the forestry sector, however (among KFS, the CFA and communities), mistrust continues to run strong. E.g. the recent tree planting exercise by county government did not involve CFA members
	3. Does the IS allow adequate space for dialogue, deliberation and analysis?	0	Recently created forums and collaborative planning processes, such as the one which brought together the CFA and WRUA for joint resource management planning, have greatly improved opportunities for deliberation. However, much more remains to be done, particularly to involve community members at large in deliberative processes around resource management
	4. Does the IS makes use of diverse types and sources of knowledge?	-1	Diverse sources of knowledge exist but are not mobilized. Community level and CFA/WRUA level decision makers tend not to get access to technical knowledge such as from government specialists
	5. Does the IS promote learning from past experiences?	-1	While there are some stakeholders at higher levels who are explicitly attempting to critically analyse past experience and revise accordingly patterns of organization and decision-making (e.g., the NGO PAFRI), reflection, monitoring, evaluation, etc. have not been institutionalized or become part of the decision-making culture within the institutional system
Room for autonomous change	6. Does the IS give communities and organizations scope for experimentation?	+1	For the most part, organizations at community level seem to have the autonomy to set their own direction. The primary exception seems to be in regards to the relationship between KFS and the CFA, with former still attempting to exercise a strict degree of control over the scope of the CFAs decisions and activities
Leadership	7. Does the IS promote the emergence of leadership within its various communities, sectors and stakeholder groups?	-1	Capacity building for local leaders has been helpful. New initiatives from emerging local leaders seem not to be opposed, but neither do the key organizations go out of their way to foster emerging leadership. The local leaders such as in the CBOs for community-based resource management tend to be drawn from local elite, with little attempt to incorporate and support potential leaders from other segments of the community

I. IS = institutional system.

Criteria		Assessment	
		Score (-2 to 2)	Score (-2 to 2)
Resources	8. Is the IS provided with accepted or legitimate forms of power and is it able to generate 'political resources'?	-1	The distribution of authority under the 2010 constitution and with the emergence of new community bodies for resource management, remains unclear. On the whole, though, these bodies tend to be constrained from taking significant decisions for resource management and from implementing those
	9. Is the IS able to mobilize adequate human resources (expertise, knowledge and labour)?	-1	While the institutional system is able to mobilize some level of communal labour, participation is less than ideal. Needed expertise is often not available
	10. Is the IS able to raise adequate financial resources?	-2	The institutional system at landscape level is little ability to mobilize resources. It is not (yet) being supported in any significant way from above
Institutional linkages	11. Does the IS have appropriate linkages among its organizations and institutions	+1	With the shift to 2010 constitution and county government, many institutional linkages for information sharing and coordination disappeared and are only slowly being replaced with new linkages. But clear improvement is being made, especially through the efforts of PAFRI. Linkages at landscape level (e.g., between the CFA and WRUA) and at the larger watershed level (e.g., among WRUAs along the Kaiti), while still new, are very promising. However, linkages downward to community members at large, and upward, especially to county government are insufficient. There is a danger that if the disconnect between decision-making at the county and decision-making within and among community-based organs such as the WRUAs and CFAs remains, that county level decision-making will undermine progress being made at community and landscape levels
Fair governance	12. Overall, is there public support for the various components of the IS?	0	The degree of legitimacy was a big challenge in the early days of the CFA and WRUA, but they have steadily been gaining acceptance by community members at large. The sense of ownership of these organizations and their plans, however, remains weak
	13. Are institutional rules within the IS fair?	+1	For the key organizations and institutions within the system, the structures and procedural rules are fair. However, greater effort must be made to proactively improve inclusivity: youth, women and the poorest are not well represented
	14. Do the various components of the IS respond to the concerns, needs, and aspirations of society?	-1	Institutional linkages up to county level, and the fact that the Governor and MCAs are directly elected has created a certain degree of responsiveness. However, at community and landscape levels, as the institutional system is very new, there has been little experience upon which the responsiveness of the system at those levels can be assessed. It is clear that responsiveness is hampered by lack of funds
	15. Are there effective accountability procedures within the IS?	-1	The challenge of accountability appears to be one primarily of the capacity to hold representatives and the relevant organizations accountable. Neither community members nor the representatives themselves have strong ideas of what community members' rights in relation to the organizations are, or the kinds of procedures to institute which could ensure accountability. The only obvious moment for accountability is when representatives for these bodies are periodically selected.
Effective decision-making	16. Is the IS effective at producing quality decisions?	+1	The weaknesses of vertical institutional linkages has constrained the ability of the institutional system to establish a clear vision and direction for community members and stakeholders at higher levels to buy into. However, with recent efforts to facilitate collaboration at landscape and watershed scales, there is a strong degree of fit with social and biophysical conditions. For example, the coming together of the CFA, WRUA and KFS to develop an Integrated Resource Management Plan facilitated by PAFRI is a move in the right direction. Decision-making processes within the landscape seem to be relatively efficient, although are constrained by insufficient experience and capacity and lack of access to technical knowledge

Figure 2. Institutional system—Summary of scores.



Colour coding for indicator scores

Effect of the institutional system on adaptive capacity	Score
Positive effect	+2
Slightly positive effect	+1
Neutral or no effect	0
Slightly negative effect	-1
Negative effect	-2

Discussion

The most pressing challenges for adaptation to climate change in the study area boil down to four main issues which respondents consistently emphasized, and, in a scoring exercise in our first workshop with them, prioritized. Three of these relate to natural resources and were closely interconnected: availability of water, soil erosion and illegal resource use. Challenges in availability of water result both from unsustainable land management practices and the changing weather conditions, with rainfall becoming more unpredictable. There is rampant land degradation in the area which threatens the integrity of the agro-ecosystem and the livelihoods of the people. This degradation has been precipitated by unsustainable activities by the local community to meet requirements of food security and development.

Capacity for adapting to these challenges is weak. There is generally a low level of formal education among the community members and traditional ecological knowledge is not adhered to as may be appropriate. There are a few farmers who have adopted technologies that are sustainable in enhancing food security. These isolated successes give hope to this vulnerable community and threatened landscape. However, the challenges are great.

The management of the upper catchment is an important concern here as this affects erosion and availability of water for everyone downhill and downstream. KAMUKIMA CFA is making progress in this regard but still struggles. Ngutwa Nduenguu WRUA has a direct mandate for watershed management, but will need to partner with the CFA in order to be effective. Management of forests, however, is only one dimension of these challenges; another relates to the soils on people's farms in a highly fragmented landscape. With every generation, farms are subdivided, further constraining the opportunities for investment in conservation measures. Overall, few if any of the challenges can be addressed primarily at farm or village level. Rather, the interconnections among all these issues across space, and among the organizations and institutions with the mandate to address them, are strong and together define a landscape level 'problemshed' for which at least some level of collaborative planning and institutional coordination will be needed. Our assessment examined the emergent institutional system for this landscape, which we have been referring to as 'middle Kaiti', and two of the key governance mechanisms within that system: KAMUKIMA CFA and Ngutwa Nduenguu WRUA.

Increasingly, the need for institutional arrangements that reflect the fact that landscapes are interconnected and that ecological functions go beyond social boundaries is being recognized. Organizations such as PAFRI and CESPAD have been promoting collaboration among WRUAs and between WRUAs and CFAs, and the development of a joint management plan by KAMUKIMA and Ngutwa Nduenguu is an important step. Such linkages are important in providing synergies and complementarity. However, WRUAs and CFAs are not the only components of the institutional system. Both the CFA and the WRUA lack the necessary resources to implement the best practices in responding to the issues and challenges of climate change and resource management. The required linkages to institutions that have resources, such as at county level, are very weak. Linkages are also required processes such as land use planning which is in the docket of the county government. At the time of the research, the progress of the county government toward being able to implement activities on the ground was still moving very slowly. There is a nominal recognition among officers in the county government that they need to work with and rely on community-level organizations such as WRUAs in order to have an impact on the ground; we saw no signs, however, of such

connections being institutionalized. This disconnect is a critical weakness, because it is at county level where the capacity to mobilize physical and financial resources is relatively higher and where authority for land use planning lies. The lack of clarity around who has authority for what, which emerged with the 2010 Constitution, still persists and is another element of this disconnect. Taken together, the capacity of the institutional system is greatly constrained by the lack of appropriate, institutionalized linkages.

Another crucial issue which began to unfold during the course of the field research and after was the disarray within Makueni county government. There was conflict between the county government and many of the MCAs. This conflict escalated to the point that, at the time of writing, steps are underway to dissolve the county Government. This will delay further any possibilities for addressing the above-mentioned weaknesses.

Within the institutional system, fair governance, while apparently improving, still faces critical challenges. Representation, inclusivity and participation by all social groups have been insufficient. Downward accountability at county level occurs only through election of Governor and MCAs every five years. Accountability is also somewhat weak at community and landscape level. We do not refer here to corruption. Rather, these weaknesses can be understood in terms of capacity. Neither representatives within the local organizations—WRUA, CFA, buffer zone groups, etc.—nor community members at large sufficiently understand their rights or ways in which they could demand for accountability from those in leadership positions. While the institutions show intentions of doing this, there is still a weakness in demonstrating accountability especially at levels where financial resources have been involved. The CFA and the WRUA did not have adequate records system for any financial transactions. This in turn weakens their legitimacy and their ability to be trusted organizations that can steer the communities in sustainably managing the landscape. For instance, sense of ownership of the CFA and WRUA and their management plans is weak.

Although the overall institutional system is viewed positively, important areas including legitimacy, learning capacity, resources, fair governance and leadership are weak implying a low capacity to cope with changes and adapt to changing climate at the landscape level. Our assessment is that many of the components needed for an effective institutional system for the middle Kaiti landscape are in place and have the potential to manage natural resources and to deliver sustainable benefits to the community, ensure the integrity of the landscape, enable the community to adapt to changing climate and enhance food security. This is a case, perhaps, of the whole being less than the sum of the parts. The weaknesses which we have highlighted are critical ones, and appropriate steps are required to address those weaknesses and meet existing challenges. The necessary linkages to the county government and other national institutions need to be strengthened. The new county government has a potential of strengthening the capacity of the local organizations especially through involving them in the land use planning process. PAFRI's efforts to build capacity, facilitate collaboration, stimulate emergence of local leaders, and establish accountability measures within the organizations should be supported. The processes of bringing WRUAs, CFAs and other key actors together should be strengthened through the provision of more sustainable funding from the government and by having such collaboration institutionalized in the county government processes and structures.

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Appendix I: Summary of organizations in Makueni county and middle Kaiti

Organization	Area	Knowledge	Relevance to focal issues of the study	Capacity	Alliances
Africa Harvest Biotechnology Foundation	<p>Provide seed animal (small stock) to improve local breeds—Toggenberg goats and KenBro chicken</p> <p>Work with 30 groups, total of 800 households</p> <p>They cover 3 locations;— Kikumini, Muvau and Wote central</p> <p>They also link the farmers to markets and credit providing communities</p> <p>Their pilot project ends in June 2013</p> <p>Not a community based organization itself</p>	Medium level understanding of natural resource related issues	Medium	N/A	With community groups and donors. Little network with county government
World Vision	Work in most parts of Makueni's dryer areas. Not a community based organization	Mainly provide relief and low knowledge of community natural resource issues	Low	N/A	Not much activity with the G.S.
Ukambani Christian Churches Society	<p>They work in Wamunyu and Wote Central</p> <p>Work with farmer groups</p> <p>Improvement of traditional drought resistant varieties include sorghum and cowpeas</p>	Good knowledge on disaster relief and sustainable enterprises	Medium	Medium	Little network with the G.S. Assessed
Department of Livestock Development (Minagri)	<p>In charge of livestock activities in the county</p> <p>Enhancement of meat (goat, cattle and chicken meat) and dairy value chains</p>	Good technical on livestock production issues	Low	Medium, not well resourced financially	Within county and National government
District Agriculture Office	<p>Agribusiness activities</p> <p>Water conservation</p> <p>And leads the farmers' stakeholder forum working groups</p>	Very good knowledge of Agricultural issues	Low	Same as Livestock Development	

Organization	Area	Knowledge	Relevance to focal issues of the study	Capacity	Alliances
KAMUKIMA CFA	Works on the hills of Kitondo, Katende, Kilala, Mutula and Mataa. They are a community based organization conserving forest resources including water and soil. Very active membership. An established organization structure	Deep traditional ecological and social economic knowledge of the area	High	Not clear, needed assessment	Members, KFS, WRUA (to a little extent), PAFRI
MAKULI CFA	Work around Makuli forest. The forest has been completely degraded and membership is now theoretical	Knows their area well		N/A	Little actual networks
Ngutwa Nduenguu WRUA	Works in a section of the Kaiti River, on the Valleys of Ngutwa and Nduenguu. Deals with issues of household livelihoods/food security, water preservation and catchment conservation. Has an active membership	Good and detailed knowledge of traditional water preservation practices and contemporary strategies of dealing with weather variation problems	High	Poorly resourced, promising potential	WRMA, county government, CFA Local members
Kaiti Riparian Resource development association	Works in the Kaiti river valley in a small section along around Kilala Aspiring to register as WRUA	Very good knowledge on the water and natural resource management issues.	Medium–high	Not fully registered	CFA, members, Ngutwa Nduenguu WRUA
National Drought Management Authority	Monitors drought impacts at household level Will be initiating contingency measures using the anticipated early warning systems Not a membership, Community Based Organization	Well knowledgeable on weather variation issues	Medium	Medium resources	County government, CFA, community members
Heifer International	Works in Kibwezi, Nzai, Makueni central, Mbooni Enhancing food security through Livestock (small and big stock), Capacity building and extension services Deals with groups with an average size of 30 households They give seed livestock to members of a group who multiply it and sell to other members at a subsidized rate They pick on groups who are already registered with social services department and are already active Works with individual farmers grouped together for NGO administration purposes	Good knowledge on livestock development issues	Low	Restricted financial resources. Programs closing down in the short run	Community members, county government

Organization	Area	Knowledge	Relevance to focal issues of the study	Capacity	Alliances
Red Cross	Works in the lower and Central Makueni (Wote) Provides irrigation equipment and capacity building of the farmer groups Provides relief Not a membership organization	Knowledge on emergence response strategies	Low	N/A	Community members, donors
ABD	Used to provide agribusiness—market linkages, Micro-finance linkages to farmer groups Just closed down and moved to Machakos	Micro-Finance knowledge, None on Natural resource issues	Low	N/A	N/A
NEMA	Provides regulatory services on any projects affecting Natural resources	Good knowledge of natural resource issues. Not so much knowledgeable on social issues at community level	Medium		County government, Min NaRE, community members
Farm Concern	Market value chains, conservation agriculture, Capacity building through training	An agribusiness promotion	Low		
PAFRI	Work with communities in the dryer parts of Makueni. They mainly provide capacity building services to community based organizations	Professionals in environment conservation issues, capacity building, resource mobilization and community mobilization	High	Moderately resourced in HR, limited finances	CFA, KFS, WRUA, WRMA,

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