

## 7 **Strengthening Policies and Institutions to Support Adaptation to Climate Variability and Change in the Drylands of East Africa**

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### **Abstract**

We analysed how policies in Tanzania and Kenya address the strategies of agro-pastoralists for coping with and adapting to climate variability and climate change, based on data from semi-structured household surveys, group discussions, policy documents and other material. Many policies indirectly address climate variability and change by focusing on drought, suggesting that some form of mainstreaming already exists. Although the United Nations Framework Convention on Climate Change (UNFCCC) National Communications and the Tanzania National Adaptation Programme of Action propose technological rather than social adaptation measures, they address a broader range of adaptation strategies than development policies do and can be used as vehicles for improving adaptation planning. Some policies focus on securing production and food availability but do not address access to resources, a major concern for the vulnerable. Despite overlaps, few policies focus on key agro-pastoral strategies such as diversification, migration and multi-locality. Mixed cropping – a core agro-pastoral strategy – needs to be re-examined to ascertain the use of key crops that reduce vulnerability. Strategies promoted in policies related to soil conservation are not widely adopted, and land-use regulations are difficult to enforce: this needs to be re-examined. The multitude of policies translates into a multitude of institutions, duplication of activities, and conflicting goals, making it difficult to achieve synergies or set priorities. Creating enactments can offer guidelines for policy implementation. We show that by integrating the perspective of agro-pastoralists, i.e. the majority of the rural poor, policies and pro-poor adaptation strategies can be strengthened.

**Keywords:** Climate variability; climate change; vulnerability; adaptation; livelihoods; agro-pastoralists; institutions; policies.

## 7.1 Introduction

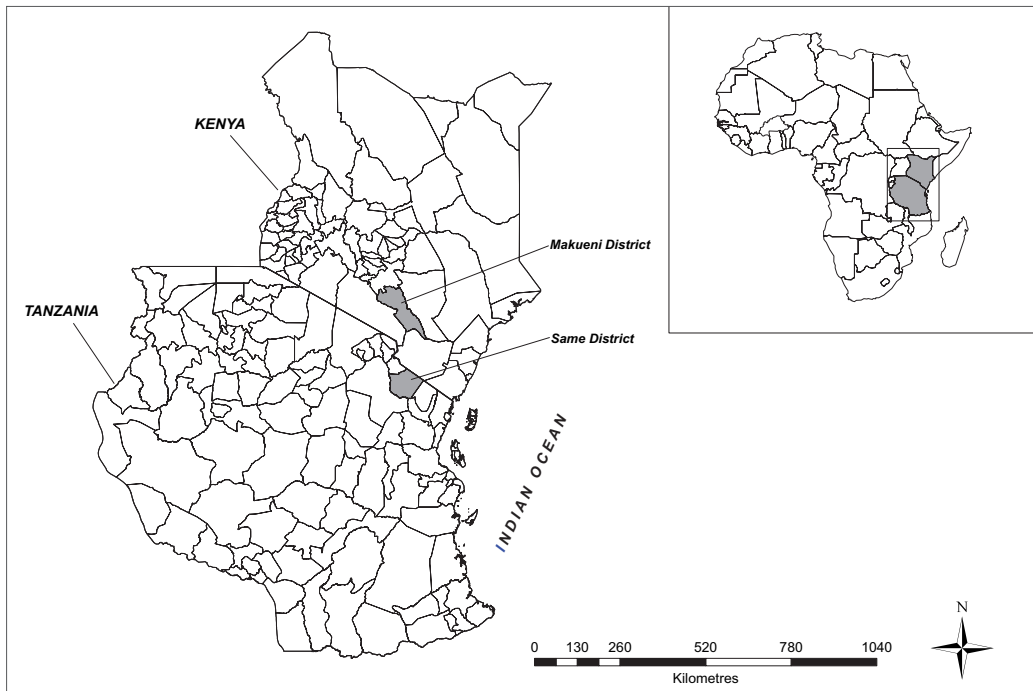
The rising atmospheric concentrations of greenhouse gases, their lagged effect on climate, and the observed effects of climate variability and change<sup>7</sup> highlight that besides mitigation, adaptation is crucial (IPCC 2007). This recognition led to Decisions 5/CP.7, 7/CP.7 and 28/CP.7 of the 7<sup>th</sup> session of the Conference of Parties of the United Nations Framework Convention on Climate Change (UNFCCC) in 2001 to support the Least Developed Countries (LDC), inter alia, in the preparation and implementation of National Adaptation Programmes of Action (NAPAs; UNFCCC 2001a, 2001b).

Widespread climate-induced food insecurity and disruption of natural resources-based livelihoods in sub-Saharan Africa (Ifejika Speranza 2006; Boko et al 2007) and inadequate capacity to deal with these phenomena indicate a close link between development on the one hand and climate variability and climate change on the other. This close link (Burton et al 2002; RoK 2002; URT 2003; Adger et al 2007; McGray et al 2007) and projections of future climate change (Hulme et al 2001; Thornton et al 2006; Notter et al 2007) imply that development policy and practice must account for climate risks in order to deal with the consequences of climate change. However, since reducing poverty does not always reduce vulnerability (Adger et al 2003; Eriksen and Kelly 2007), mainstreaming climate change into development policy and practice can pre-empt maladaptation to climate change (Huq et al 2003; Klein 2008).

Thus public policy and its importance in facilitating adaptation to climate change (Adger et al 2007) remain a major focus of adaptation studies (Smith and Lenhart 1996; Burton et al 2002; Tompkins and Adger 2005). Because policies define issues, offer guidance and influence decision-making and societal action, mainstreaming adaptation into development policies will ensure that climate change risks are considered in decision-making and that activities are aimed at *reducing vulnerability* and *increasing adaptive capacities*. Therefore, identifying available policy options (Smith and Lenhart 1996) and assessing how they, together with development practice, reduce vulnerability (Burton et al 2002) are major steps in adaptation. In such an assessment, understanding societal responses and their implications for adaptation is a crucial element (Burton et al 2002) and a useful starting point in developing a national climate policy framework (Tompkins and Adger 2005).

This article analyses how specific policies in Kenya and Tanzania either support or undermine the strategies of agro-pastoralists for adapting to climate variability and climate change. The consequences of national-level climate policy are experienced at local, national, regional and international scales (Tompkins and Adger 2005). Thus national-level climate policy needs to account for such consequences – in particular, it needs to take account of how adaptation is practised on the ground and offer guidance on how to reduce vulnerability and promote adaptation to climate change. Few previous studies have focused on how to integrate global climate policy into national development policies in Africa (Olsen 2006), or on how national policies take account of coping and adaptation practices at local levels (Eriksen 2000; Orindi and Eriksen 2005). The present article, accordingly, reflects on how to mainstream adaptation into development policies and how to strengthen such policies in their responses to climate variability and climate change in smallholder agriculture. It uses agro-pastoral responses to drought in arid and semi-arid lands (ASALs) as an analytical lens. The findings are based on research conducted in Kenya and Tanzania (Figure 1) from 2002 to 2004.

Fig. 1  
The Kenyan and  
Tanzanian case  
study areas. (Map  
by Chinwe Ifejika  
Speranza)



About 80% of Kenya is ASAL, while between 45% and 75% of Tanzania consists of semi-arid areas (Morris et al 2001).<sup>8</sup> Drylands comprise arid, semi-arid and hyper-arid areas. ASALs cover more than 70% of East Africa, with pockets of humid and sub-humid high-potential resource islands. Drylands have growing periods of less than 120 days (FAO 1993), high temperatures and erratic rainfall, poor soils, and vegetation consisting of shrubs, scrub and grasses. The ecosystems are fragile, with low crop and livestock production, except in areas where irrigation is possible. Subsistence agriculture, consisting of sedentary agriculture, agro-pastoralism and nomadic pastoralism, is the major land use. Wildlife conservancy is practised as well. Due to population increase and changes in land tenure, areas once used for extensive grazing or fallow have in many cases been converted to permanent cropping.

The predominance of rainfed subsistence agriculture, chronic poverty, poor governance, population pressure and use of marginal lands for rainfed agriculture (Ogallo 2000; Williams 2000), the dominance of water-demanding maize (Williams 2000), poor infrastructure and HIV/AIDS (WHO 2002) make agro-pastoralists vulnerable to climate variability. In addition, climatic hazards are likely to increase in frequency and severity due to climate change (Paavola 2003; Christensen et al 2007; Notter et al 2007). Climate projections indicate increases in precipitation only for a few parts of East Africa. Climate change will likely worsen the adverse effects of climate variability in the region by increasing droughts, floods and water stress, diminishing the amount of land suitable for agriculture, and reducing agricultural production, food security and livelihood security (Hulme et al 2001; Boko et al 2007). Hence reducing vulnerability and increasing adaptive capacity are fundamental to reducing the adverse impacts of climate variability and climate change.

## **7.2 Conceptual framework and methodology**

Adaptation refers to adjustment in practices, processes or structures, in response to actual or expected changes in climate or their effects, which moderates harm or exploits beneficial opportunities (modified from Dixon et al 2003; IPCC 2007). Adaptation can be anticipatory, i.e. taking place before the impacts of climate change are observed. It can also be autonomous, i.e. constitute a conscious response not to climatic stimuli but rather to ecological changes in natural systems and to market or welfare changes in

human systems. Planned adaptation is the result of a deliberate policy decision, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state (IPCC 2007). Adaptation thus involves building adaptive capacity to increase the ability to adapt to changes and to transform adaptive capacity into action by implementing adaptation actions (Adger et al 2005). Therefore, formulating or reviewing policies in response to actual or expected changes in climate is a form of adaptation.

The ability of agro-pastoralists to cope with and adapt to climate variability and climate change depends on their adaptive capacities, their resilience, and their vulnerability. Vulnerability to climate variability and climate change expresses the degree to which a person, group or human–environment system is likely to be exposed to, adversely affected by, and unable to cope with and recover from the impacts of climate variability and climate change (modified from Bohle et al 1994 and IPCC 2007). Vulnerability is, among other things, a function of adaptive capacity, i.e. the ability of an actor or a system to adjust to climate variability and climate change, to moderate potential damage, to take advantage of opportunities, or to cope with the consequences (IPCC 2007). This relates to resilience – the ability to maintain livelihoods in the face of disturbances or stresses arising from social, political, economic and environmental change (Adger 2000; Quinlan 2003; IPCC 2007). The livelihoods assets of an actor or actor group and the political and institutional frameworks in which actors are embedded are crucial determinants of adaptive capacity. Institutions refer to norms and values (e.g. ownership rights), both formal and informal, as well as agencies and organisations (e.g. water bodies).

The present synthesis was informed by two studies carried out within the Swiss National Centre of Competence in Research (NCCR) North-South programme, on drought vulnerability and risk in the agro-pastoral areas of Makueni District, Kenya (Ifejika Speranza 2006) and on management of common-pool resources in the Pangani Basin, Eastern Same District, Tanzania (Mbeyale 2008). The studies were conducted to find out why agro-pastoralists and pastoralists remain highly vulnerable to the adverse impacts of climate variability (including drought) and how the nature of access to natural resources influences their capacities to meet their livelihood needs. The assumptions were that livelihood assets, actor strategies, policies and institutions shape livelihood outcomes and vulnerability to climate variability and climate change. The aforementioned factors were analysed in both case studies. This synthesis presents some of the results of the studies.

### 7.3 Overview of the case studies

The links between policies, institutions and livelihood strategies are explored using data from semi-structured surveys of 127 and 339 households in Makueni District, Kenya and Same District, Tanzania, respectively, conducted between 2002 and 2004. The questions asked covered household livelihood strategies, climatic hazards such as droughts and floods, access to natural resources, the impact of institutional changes on the management of common-pool resources, and interactions between the households and various government departments. Other data sources were focus group discussions, workshops, policy documents and other literature. Each case study is introduced below, followed by a synthesis of adaptation practices and their links to policies and institutions. The two case studies depict different socio-ecological contexts (Table 1).

In both areas, agriculture is the major source of livelihood and accounts for more than 75% of household income. About 40% live below the poverty line (USD 1 per day per person). A mainly young population, increasing population density, subsistence agriculture and recurrent droughts are major features. Both areas derive advantages from their location between major urban centres: trading centres have emerged at which travellers are offered services and sold local produce. However, these centres have attracted people from other

Table 1

| Characteristics of the two study areas. | <b>Features</b> | <b>The semi-arid areas of former Makueni District, Kenya</b><br>(now Makueni, Mbooni, Kibwezi, and Nzaui districts)                      | <b>The semi-arid areas including the wetlands and floodplains of Same District, Tanzania</b>                                    |
|---|-----------------|--|---|
| Location                                |                 | Southeast Kenya<br>lat. 1°35'S and 3°S /<br>lon. 37°10'E and 38°30'E   | Northeast Tanzania<br>lat. 4°15'S and 10°S /<br>lon. 35°10'E and 40°E   |
| Altitude                                |                 | 400 m to around 600 m  | 500 m to around 900 m   |
| Socio-ecological context                |                 | Semi-arid lowland agro-pastoral subsistence system with maize-dominant mixed cropping, cowpeas, pigeon peas, as well as cattle and goats | A densely populated highland-lowland subsistence/irrigation system with maize for subsistence and rice and ginger as cash crops |
| Inhabitants                             |                 | Mainly Kikamba   | Pare farmers, agro-pastoralists and charcoal makers; Maasai pastoralists  |

Sources: Ifejika Speranza 2006; Mbeyale 2008.

areas. As a result, the benefits for local people in terms of wage labour and paid employment are not sufficient to significantly reduce the widespread poverty.

The Makueni study area in its lower stretches is crossed by the Athi River, one of the longest perennial rivers in Kenya with a length of about 390 km. Although the Athi and other smaller perennial rivers (Kambu, Kiboko and Mtito-Andei) hold potential for irrigation, agro-pastoralists have not used them widely, mainly due to inadequate resources and land tenure-related constraints in access to river water. The few that do practise irrigation grow crops such as onions, cabbage, okra and sugarcane, but only at a small scale along the Athi River and the seasonal streams of the Kibwezi. The lowland semi-arid Same study area is directly dependent on the mountain zone for water. The forests of the South Pare Mountains are the source of all rivers and streams that feed the lowlands. The interspersed wetlands are important grazing areas, especially during dry seasons. Over the years, springs and streams have dried up (Ngana 2002) due to watershed degradation and high-water stress as a result of increased use by the population upstream. The situation is worsened by the institutional setup, which no longer provides for equitable water allocation for irrigation to both lowland and mountain communities, and does not take account of the differential vulnerabilities and risks that the communities face.

## **7.4 Agro-pastoral strategies and adaptation to climate variability and change**

The purpose of this section is to examine agro-pastoral strategies and how these (can) serve as strategies for adapting to climate variability and change. The major strategies of agro-pastoralists (for details see Ifejika Speranza 2006; Ifejika Speranza et al 2007; Mbeyale 2008) are summarised below in terms of crop- and livestock-based strategies and cross-cutting strategies.

### **7.4.1 Crop- and livestock-based strategies**

**Mixed cropping:** Households practise mixed cropping primarily to reduce risks, including climatic risks. However, maize remains dominant, covering most of the cropland. Despite climatic risks, people prefer to grow and eat maize, as it has multiple uses. It is the major staple, can easily be sold, and the stover is used for fodder. While rice and ginger are important cash

crops in the Same area, in the Makueni study area maize is sold to generate income. There is therefore a need to expand the potential of mixed cropping as an adaptation strategy by increasing the proportion of drought-tolerant crops and maize varieties in the cropping strategies.

**Adoption of drought-tolerant crops/maize species:** Although the actors widely acknowledge the advantages of drought-tolerant crops and maize species, only about 10% of the households use exclusively drought-tolerant maize species. This is due to their lower production, higher seed costs, and less preferable consistency and taste by comparison with the traditional variety. This low adoption exposes agro-pastoralists to drought impacts.

**Adaptive/flexible cropping practices:** This is done by intercropping, planting crops to coincide with the rains, or forfeiting planting for the season for the purpose of reducing crop loss.

**Adaptive livestock production:** Agro-pastoralists keep a mix of livestock such as local zebu cattle, goats, sheep and poultry to reduce risks and to produce meat for various purposes. Few improved breeds are kept for milk production.

**Ensuring access to feed:** Pastures are preserved and fodder is stored. Security and pasture conditions determine where livestock is grazed.

**Livestock as 'banks':** Actors bank their savings in livestock. However, drought causes livestock to emaciate and depreciate.

**Food preservation and storage:** This strategy is limited, as most agro-pastoralists produce less than they need to ensure their subsistence.

**Securing access to natural resources (land and water):** Actors harvest rainwater and secure access to other water resources by joining water cooperatives, or to land through arrangements with other land owners.

**Accessing knowledge and information:** Actors learn from one another, from radio programmes, from outreach workshops with researchers, and from public and private extension services. The aim of learning is to improve farm practices and diversify into non-farm activities.

### 7.4.2 Cross-cutting strategies

Cross-cutting strategies are not directly linked to agro-pastoralism, but the income derived is invested in crop and livestock production and is thus crucial for increasing households' adaptive capacities. The overarching strategy is diversification in various forms, including:

- charcoal production and casual labour;
- migration and multi-locality of livelihoods;
- investing in the education of children;
- nurturing social and family networks;
- copying what others are doing ('copy-cat' strategies).

'Copy-cat' is used here as an analogy to describe uniform adoption of other actors' strategies that often ends with adverse outcomes. It is frequently observed that shortly after a community member has started an enterprise – e.g. opened a village shop – many other community members copy this livelihood activity and open their own shops, leading to a mushrooming of village shops. By doing so they increase the supply of goods and services on offer, thereby causing demand to diminish and stagnate, and ultimately reducing the economic viability of such enterprises. Diffusion of innovations requires that people copy what others are doing to achieve better livelihood outcomes. Copying could thus be a viable strategy, provided that it is based on experience from best practices, also with regard to conducive overall conditions. However, our research shows that those who copy do not adequately consider the overall situation and factors such as limited demand and market saturation in rural areas. This leads to short-lived diversification and economic loss.

Faced with drought, agro-pastoralists reduce their food and water consumption, work as temporary labourers, produce charcoal, sell off livestock, buy food, and collect food aid. Even in 'normal' years most agro-pastoralists have difficulties building up assets; under drought conditions they are forced to dispose of these assets. Generally, they are in a position to maintain their asset level but need external support to increase it. The following section analyses how policies and institutions take these strategies into account.

## 7.5 Policies, institutions, and adaptation to climate variability and change

In Kenya and Tanzania there are no separate drought, flood or disaster preparedness policies (although one is being prepared in Kenya); nor do any specific climate variability and climate change policies exist. Issues related to climate are addressed in various policies and planning documents (Table 2) including the UNFCCC National Communications (NCs) and the Tanzanian National Adaptation Plan of Action (NAPA). Although not yet a policy, the UNFCCC-initiated NCs and the Tanzanian NAPA may evolve into one in the future. Most policies target the agricultural sector (Eriksen 2000). They aim to improve production and enhance drought resistance by developing and promoting drought-resistant crops and increasing water supply and irrigation. Nevertheless, these efforts do not specifically consider the extreme variability that confronts households (Eriksen 2000). This section discusses how the various policies relate to the agro-pastoral strategies listed above. The discussion is organised according to the list of strategies presented in Section 6.4; a non-exhaustive overview of how policies relate to strategies is provided in Table 2.

**Mixed cropping and adoption of drought-tolerant crops/maize species:** Many policies relate to mixed cropping (Table 2) but do not explicitly consider how and under what cultural, socio-economic and biophysical conditions it is practised. Only at the policy implementation level do extension officers actively promote mixed cropping, although maize remains dominant. The policies encourage farmers to grow drought-resistant crops, e.g. adapted maize varieties, millet and cassava. Some research centres have developed disease- and drought-resistant crops such as maize, sorghum, millet and cassava varieties that also take a shorter time to mature (URT 1997a; Oluoch-Kosura and Karugia 2005; URT 2007). Yet actors prefer maize to drought-tolerant crops like millet and sorghum, and mainly use maize varieties that are not drought-tolerant. The low rate of adoption shows that links remain weak between policies and agro-pastoralists' practices, as well as between crop researchers and agro-pastoralists' realities. To improve this situation, crop development approaches should allow for cooperation between agro-pastoralists and scientists. Besides the focus on maize, there is a need to promote adoption of drought-tolerant crops like millet and sorghum and to increase their acceptability. Accessing external markets for these crops is an option that can generate additional income.

Table 2

|   | Mixed cropping | Adoption of drought-tolerant crops/maize species | Adaptive/flexible cropping practices | Adaptive livestock production | Ensuring access to feed | Livestock as 'banks' | Food preservation and storage | Securing access to natural resources (incl. land) | Securing access to water | Accessing knowledge and information | Livelihood diversification | Charcoal production | Migration and multi-locality of livelihoods | Investing in education | Nurturing social and family networks | 'Copy-cat' strategies |
|---|----------------|--|--------------------------------------|-------------------------------|-------------------------|----------------------|-------------------------------|---|--------------------------|-------------------------------------|----------------------------|---------------------|---|------------------------|--------------------------------------|-----------------------|
| <b>Agro-pastoral strategies</b>                       |                |  |                                      |                               |                         |                      |                               |   |                          |                                     |                            |                     |   |                        |                                      |                       |
| <b>Policies</b>                                       |                |  |                                      |                               |                         |                      |                               |   |                          |                                     |                            |                     |   |                        |                                      |                       |
| RoK Strategy for revitalising agriculture 2004        | e              |  |                                      |                               |                         | o                    | e                             |   |                          | e                                   | a                          |                     |   |                        |                                      |                       |
| RoK Food policy – Sessional paper No. 4, 1981         | e              |  |                                      |                               |                         |                      | e                             |   |                          | e                                   |                            |                     |   |                        |                                      |                       |
| URT National agriculture and livestock policy 1997a   | e              | e  | d                                    | d                             |                         | d                    |                               |   | e                        | e                                   |                            |                     | e   |                        |                                      |                       |
| RoK Draft national livestock policy 2007a             |                |  | e                                    | d                             | d                       |                      |                               |   | e                        |                                     |                            |                     |   |                        |                                      |                       |
| URT National livestock policy 2006                    |                |  | e                                    | d                             | d                       |                      |                               |   | e                        |                                     |                            |                     |   |                        |                                      |                       |
| RoK National environment action plan 1994             | e              |  |                                      |                               |                         |                      |                               |   |                          |                                     |                            | d                   |   |                        |                                      |                       |
| RoK Environmental action plan for ASALs 1992          | e              |  |                                      |                               |                         |                      | d                             |   |                          |                                     |                            |                     |   |                        |                                      |                       |
| URT National environmental policy 1997b               |                |  |                                      |                               |                         |                      | d                             |   | e                        |                                     |                            |                     |   |                        |                                      |                       |
| RoK Forest policy 2000a                               |                |  |                                      |                               | d                       |                      |                               |   |                          |                                     |                            | d                   |   |                        |                                      |                       |
| URT Forest policy 1998a                               | e              |  |                                      |                               |                         |                      |                               |   |                          |                                     |                            | d                   |   |                        |                                      |                       |
| RoK Draft wildlife policy 2007b                       |                |  |                                      |                               | d                       |                      |                               |   |                          |                                     |                            |                     |   |                        |                                      |                       |
| URT Wildlife policy 1998b                             | e              |  |                                      |                               |                         |                      |                               |   |                          |                                     |                            |                     |   |                        |                                      |                       |
| RoK Draft national land policy 2006a                  |                |  | e                                    | d                             |                         |                      | d                             | d   |                          |                                     |                            |                     |   |                        |                                      |                       |
| URT Land policy 1997c                                 | e              | e  |                                      |                               |                         |                      | d                             |   |                          |                                     |                            |                     |   |                        |                                      |                       |
| URT Energy policy 1992                                | e              |  |                                      |                               |                         |                      |                               |   |                          |                                     |                            | d                   |   |                        |                                      |                       |
| URT National employment policy 1996                   |                |  |                                      |                               |                         | o                    |                               |   | e                        |                                     |                            |                     |   | e                      |                                      |                       |
| URT Cooperative development policy 1997d              |                |  |                                      |                               |                         | o                    |                               |   | e                        |                                     |                            |                     |   | e                      |                                      |                       |
| RoK Water policy 2006b                                |                |  |                                      |                               |                         |                      |                               | d   |                          |                                     |                            |                     |   |                        |                                      |                       |
| URT Water policy 2000a                                |                |  |                                      |                               |                         |                      |                               | d   |                          |                                     |                            |                     |   |                        |                                      |                       |
| URT Water sector development strategy 2004            |                |  |                                      |                               |                         |                      |                               | d   |                          |                                     |                            |                     |   |                        |                                      |                       |
| RoK Vision 2030 (2007c)                               |                |  |                                      |                               |                         |                      |                               | d   | e                        | a                                   |                            |                     |   |                        |                                      |                       |
| URT Development vision 2025 (2000b)                   |                |  |                                      |                               |                         |                      |                               | d   | e                        |                                     |                            |                     |   |                        |                                      |                       |
| RoK Free primary education 2003                       |                |  |                                      |                               |                         |                      |                               |   | e                        |                                     |                            |                     |   | e                      |                                      |                       |
| URT Education and training policy 1995                |                |  |                                      |                               |                         |                      |                               |   | e                        |                                     |                            |                     |   | e                      |                                      |                       |
| RoK Poverty reduction strategy paper 2000b            |                |  |                                      |                               |                         | o                    |                               |   | e                        | e                                   |                            |                     |   | e                      |                                      |                       |
| URT Poverty reduction strategy paper 1997e            |                |  |                                      |                               |                         | o                    |                               |   | e                        | e                                   |                            |                     |   | e                      |                                      |                       |
| URT Rural development strategy 2001                   | a              | e  | e                                    |                               | o                       | a                    | d                             | e   | e                        | e                                   | d                          |                     | e   | e                      |                                      |                       |
| RoK first National Communication to the UNFCCC 2002   | a              | a  | a                                    | e                             |                         |                      |                               |   | o                        | o                                   |                            |                     |   |                        |                                      |                       |
| URT initial National Communication to the UNFCCC 2003 | e              | e  | e                                    | e                             |                         | e                    |                               |   | o                        | o                                   | e                          |                     |   |                        |                                      |                       |
| URT National Adaptation Plan of Action (NAPA) 2007    | e              | a  | e                                    | e                             | e                       |                      |                               | e   | e                        | e                                   | d                          |                     |   |                        |                                      |                       |

Agro-pastoral adaptation strategies and related policies. Key: e = encouraged; d = discouraged; a = acknowledged; o = indirectly addressed through related options that can lead to positive outcomes; empty field = not addressed.

**Adaptive/flexible cropping practices:** Apart from the NCs and the Tanzanian NAPA (RoK 2002; URT 2003, 2007), flexible cropping practices are not targeted in any policies. Meteorological departments provide seasonal outlooks based on which some actors adapt their practices. However, extension services have inadequate resources and decision-making power to enable fast and flexible responses to climate variability and climate change.

**Adaptive livestock production:** The Tanzanian national-level agriculture and livestock policy discourages traditional pastoral practices; the district government encourages people to maintain no more than 50 head of livestock to avoid resource conflicts with farmers and land degradation. However, farmers have trouble reducing herds due to their importance to household income as well as the cultural values attached to livestock. Nevertheless, this culture is likely to change gradually through education; the Maasai have now started to farm in addition to keeping animals.

**Ensuring access to feed:** While many policies encourage adaptive livestock production, they rather discourage access to public grazing resources. Yet under drought conditions flexible access to grazing resources is crucial. The NCs and the Tanzanian NAPA do encourage provision of such access. The various policies guiding rangeland use (Table 2) have conflicting goals: wildlife policies aim to protect wildlife and provide a basis for tourism at the expense of fencing out those most dependent on resources such as grazing lands, wild plants and animals. In general, the benefits of tourism are rarely shared with local people. By accessing pastures in protected areas during droughts, agro-pastoralists risk penalisation by the government and conflict with wildlife. Buffer grazing zones for livestock during droughts are needed, but policies only make provisions for buffer zones for wildlife. In the Tanzanian study area, policies (URT 1998a, 1998b) remain silent regarding the problems that communities face during droughts, and although district governments can permit pastoralists to migrate to other areas with better pastures, they rarely do so.

**Livestock as 'banks', focused asset accumulation and divestment:** Savings and Credit Co-operatives (SACCOs) are widespread, but many agro-pastoralists continue to accumulate their wealth in the form of livestock even though the traditional strategy of 'storing wealth' in livestock no longer suits current conditions. Policies (e.g. URT 1996, 1997d) support the formation of savings and credit societies, but these are still in their infancy in Tanzania. Rural banking and credit services are needed as complementary sav-

ings and credit options for agro-pastoralists. Yet there are few financial and credit services in rural areas. Where they do exist, defaulting on repayments, low capitalisation, and poor capacity among communities to use available funds limit their potential to secure rural livelihoods effectively. While policies (URT 2000b, 2001; RoK 2007c) acknowledge the importance of livelihood diversification, no provision is made to train rural actors with regard to investment opportunities and their management. There is thus a need to increase awareness about financial services and to provide such training.

**Food preservation and storage:** Several policies (Table 2) and institutions address food availability, as well as food distribution and its coordination between the national, district and village levels. In this context, climate variability and climate change are addressed indirectly through their impacts, i.e. in this case through food insecurity. In order to discourage relief-food dependency, measures were introduced to couple relief-food distribution with productive work (RoK 2007d). Corruption is another problem: some politicians will want to send food to their constituencies even when there is no food shortage. Yet verification measures that aim to combat fraudulent food distribution increase bureaucracy and delay food distribution. Thus, there is a need to depoliticise food distribution and make it transparent.

**Secure access to natural resources (including land):** Policies that promote secure access to land (Table 2) also have provisions for managing conflict over natural resources (URT 1997b, 1997c, 2000a). Still, governments appear to have conflicting goals as areas that pastoralists and agro-pastoralists need for their livelihoods are converted into protected areas. Alternatives for the actors to bridge crisis periods are not considered (URT 1997a, 2001, 2006). Other policies have elements that can reduce vulnerability by allowing communities to participate in tourism. Yet there are very few examples where these principles of access and benefit sharing, community participation in tourism, and compensation for damage by wildlife are implemented.

**Ensuring access to water:** Agro-pastoralists harvest rainwater and runoff, but the potentials of these practices have not yet been fully exploited. Implementation of the Water Sector Development Strategy (URT 2004) led to the constitution of Water Users Associations (WUAs) in Same district. In the Makueni study area, the government also supports irrigation by smallholders in the few areas where it is viable. While WUAs have already been incorporated into policies in Kenya (RoK 2006b), they have not yet been implemented in the Makueni study area. Studies in similar areas in Kenya

show that WUAs are effective in reducing water conflicts related to over-abstraction (Liniger et al 2005; Kiteme and Wiesmann 2008). Plans call for making water available in ASALs and rehabilitating existing irrigation schemes (URT 2000a, 2000b; RoK 2007a, 2007c). In the Same study area, separation into upstream and downstream management led to a mismatch between the social and ecological scales of Common Properties Resources (CPRs) management and institutional failure. It worsened resource use conflicts and degradation of the CPRs. The ensuing reduction in access to water for irrigation reduced the capacity of communities to cope with climate variability and climate change. However, it has to be noted that the potentials for irrigation have not yet been fully explored.

**Accessing knowledge and information:** Many policies in both countries (Table 2) aim to improve access to knowledge and information for the rural population. In Kenya, the Ministry of Agriculture (MoA) and the Ministry of Livestock and Fisheries Development (MLFD), through their extension services, are major providers of agricultural and related information. The private sector and NGOs disseminate information as well. The meteorological departments provide seasonal outlooks, collaborate with the media, and produce a radio and internet programme in Kenya. Yet various challenges such as inadequate historical data and sparse distribution of stations (Ogallo 2000) hamper provision of reliable climate information and need to be addressed. Hence, these institutions require sustained financial and technical support.

**Charcoal production:** Various policies (Table 2) aim to promote a sustainable environment, increase forest cover, and ensure access to energy (RoK 1994, 2000a, 2007c; URT 1997b), as well as reduce land degradation, lack of accessible good quality water, and loss of wildlife habitat (URT 1998b; RoK 2007b). Yet no viable strategies have been proposed to reduce dependence of both rural and urban populations on fuelwood. In Kenya, the forest policy (RoK 2000a) aims at forest protection. It does not foresee co-management with the local population. However, reducing or avoiding deforestation can help reduce CO<sub>2</sub> emissions, thereby sequestering carbon and reducing the greenhouse effect and global warming. In both countries there is currently no viable alternative to charcoal and fuelwood; charcoal production thus remains an important strategy for the poor. Efforts to develop alternatives have either not been successful or failed to be widely adopted. Continued research is thus needed.

**Education:** Agro-pastoralists value education. They believe that educated persons are more likely to escape poverty by engaging in non-farm income generating activities (Mortimore 2003). Educational policies in both countries (Table 2) aim to achieve universal primary education. These policies have indeed led to increasing numbers of enrolled pupils (Vos et al 2004). However, the aim of raising literacy levels has been easier to meet than the aim of fostering growth and development through education, as a growing number of graduates find employment only months after graduation. There is thus a need to harmonise the various existing education policies and adapt them to emerging trends in the employment sector.

**Activating social and family networks:** Rural actors, especially women, organise themselves in Self Help Financial Groups (SHFGs) to increase their financial capacity. However, experience has shown that SHFGs collapse in a crisis. Ensuring a stable capital base for such groups is crucial in order to enable them to provide financial services continuously. No policies explicitly encourage remittances to rural areas despite the demonstrated positive effects on the household and rural economies (Ifejika Speranza 2006) or, internationally, to the recipient national economies. The proven positive effect should encourage governments to create incentives for such transfers through measures such as tax exemption. ‘Social/familial insurance’, which depends solely on family networks, needs to be formalised into social insurance and micro-insurance to improve resilience. No policies explicitly address these existing forms of insurance that rural actors use.

Adaptation in agriculture features prominently in the first NCs of both Kenya and Tanzania (RoK 2002; URT 2003). According to the first NC of Kenya, “[a]daptation options in the agriculture sector would include: development of early maturing and high-yielding crop varieties and adaptation of agricultural technologies from analogue environments” (RoK 2002, p xx in summary). In relation to drought, the proposed adaptation strategies include the

*[i]ntroduction of drought-tolerant/escaping crops, irrigation and fertilizers; development of high-yielding, more resistant, early maturing and disease- and pest-tolerant crops. Adaptation strategies will include disposing of stocks early before the onset of drought. (RoK 2002, p 44)*

For Tanzania,

*the proposed adaptation measures for crop production mainly involve land-use and management related changes. Changes in land use involve changes in farmed area, changes in the crop type to suit the changes in climate conditions, and changes in crop location. Changes in management require the introduction of an irrigation system and different crop cultivars, improved manure/fertilizer use, control of pests, weeds and diseases, change in planting dates, and better exploitation of climate and weather data.* (URT 2003, p 44)

Apart from the technological adaptation measures, the measures proposed do not directly address the major agro-pastoral strategies identified in the previous section. They do not consider the underlying socio-economic factors that cause vulnerability, impair livelihoods and hinder the adoption of adaptation strategies. Orindi and Eriksen (2005) published similar findings on the Ugandan initial national communication on climate change.

This shows that many policies do not adequately address issues that are of concern to agro-pastoralists. Many policies are cross-sectoral; their addressing multiple issues bears the risk of conflicting goals and overlap with sectoral policies. It is not clear whether such cross-sectoral policies supersede sectoral policies. There is thus a risk of duplication of activities, as several institutions focus on ensuring food security and promoting the development of drought-tolerant crop species. Some key aspects of agro-pastoral strategies, such as diversification, migration and multi-locality, are not addressed at all in many policies. Strategies prominently promoted in some policies (e.g. RoK 2002, p 119), such as forest protection and soil conservation practices (e.g. no tillage or mulching), are not widely adopted, and specifications on land use are often not adhered to or difficult to enforce.

The policies displayed in Table 2 show that agro-pastoral strategies are not limited to the agricultural sector but span various socio-economic sectors. The diversification strategies of agro-pastoral actors call for a shift from perceiving them as being active exclusively in the agricultural sector to seeing them as partly earning their livelihood from non-agricultural sectors. Accordingly, policies should take account of these cross-sectoral diversification strategies. Table 2 also shows that some strategies, such as mixed cropping, need to be explicitly addressed and re-examined in more detail, as they form the core of agro-pastoral cropping strategy.

The multitude of policies addressing agro-pastoral strategies call for some form of policy coordination. While the Kenya Environmental Management and Coordination Act of 1999 (in force since January 2000) aims to harmonise environmental policies and mainstream environmental concerns into national planning and management processes in Kenya, including facilitating implementation of climate change mitigation, enforcement and coordination remain challenging (RoK 2002). The Tanzanian government acknowledges that “the institutional framework for climate change in Tanzania should take into account the need for an economy-wide holistic approach to mitigation and adaptation” (URT 2003, p 63). It sees the exploitation of sectoral synergies as an important element and involves all relevant sectors. Hence, perspectives from rural development and from agro-pastoralists, who constitute a large proportion of the rural poor, offer insights into how to strengthen policies and pro-poor adaptation strategies.

## **7.6 Conclusions**

This study analyses how national policies consider local coping and adaptation strategies. The analysis shows that apart from drought, climate variability and climate change are not explicitly addressed in policy documents. Floods, storms, frost and extreme heat also need to be addressed. Several activities concerned with enhancing rural actors’ adaptive capacities need continued support in order to secure agro-pastoral livelihoods.

The various policies addressing different responses to climate variability and change show that an adaptation policy (Burton et al 2002) and some degree of mainstreaming already exist. The fact that these policies were developed to address development in the context of climate variability and other driving factors rather than focusing more exclusively on climate change impacts reflects the close link between climate change adaptation and development.

However, policies do not adequately address agro-pastoral strategies. In some cases, strategies prominently promoted in policies are not widely adopted by agro-pastoralists. There is a need to re-examine the adoption and non-adoption of certain policy-proposed strategies. Failure to do so will limit the adoption and effectiveness of adaptation measures.

The proposed activities of the NAPA (URT 2007; Osman-Elasha and Downing 2007) and the planned national strategies on adaptation are some proc-

esses that could integrate climate variability and climate change into the development process. However, a holistic policy on rural development that focuses on securing production, availability of and access to natural resources, thereby reducing poverty and vulnerability, will most likely capture local actor realities in adaptation planning. The conflicting goals of some policies can be reduced by adopting the perspectives of the vulnerable. This is imperative when the aim is to reduce poverty and where the majority of the poor are rural actors.

This contribution used agro-pastoral coping and adaptation practices as a lens to analyse how policies and institutions take them into account in the context of climate variability and climate change. This does not mean that other perspectives and levels are not important. Nevertheless, this article highlights issues that need to be addressed from a rural pro-poor perspective in order to achieve resilience to climate variability and climate change.

## Endnotes

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<sup>7</sup>This article uses the definitions for climate variability and climate change coined by the Intergovernmental Panel on Climate Change (IPCC): “Climate variability refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate on all spatial and temporal scales beyond that of individual weather events” (IPCC 2007, p 944); “Climate change refers to a change in the state of the climate that can be identified (e.g. by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer” (IPCC 2007, p 943).

<sup>8</sup>Various definitions of arid and semi-arid areas in Tanzania exist due to difficulties in delineating them (Morris et al 2001).

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