

Environmental Change & Maize Innovation in Kenya: Exploring Pathways In and Out of Maize

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1 Environmental Change and Maize Innovation Pathways in Kenya: Seeking Resilience through Diversity

DYNAMIC CHANGE, DIVERSE PATHWAYS

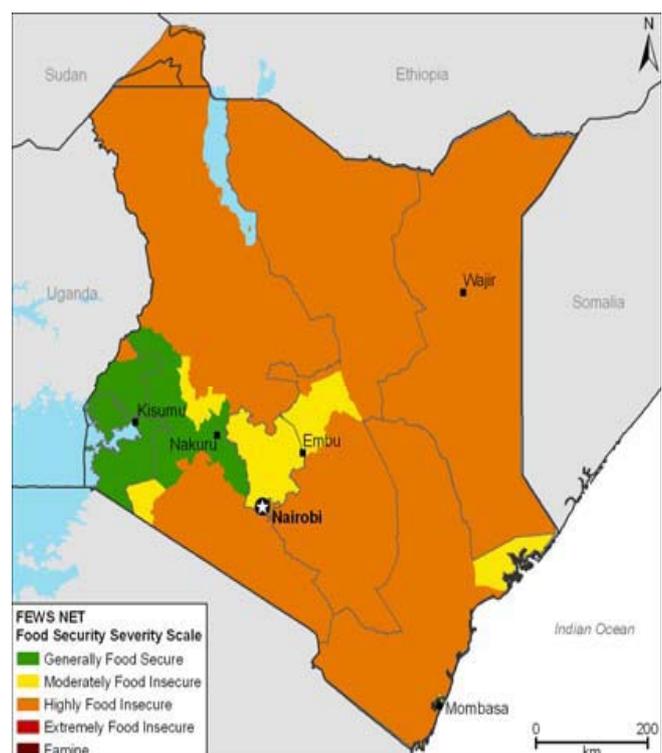
In an era of unprecedented change, the STEPS Centre (www.steps-centre.org), a global research and policy engagement centre supported by the UK Economic and Social Research Council (ESRC), is undertaking studies in different parts of the world linking environmental sustainability and technological innovation with a focus on poverty reduction and social justice. In Kenya, STEPS Centre research partners from the African Centre for Technology Studies (ACTS), the Centre for African Bio-entrepreneurship (CABE), Tegemeo Institute at Egerton University, in association with the Institute of Development Studies (IDS) and Science and Technology Policy Research (SPRU) at the University of Sussex, UK, have been collaborating on a study to examine 'Environmental Change and Maize Innovation Pathways'. This briefing paper describes the team's efforts to analyse the potential of, and constraints on, alternative 'pathways in and out of maize', the country's key staple cereal crop, in the face of dynamic environmental, social and technological change.

Climate change and variability present new research and development challenges, particularly for Sub-Saharan African countries, where the majority of the population depend on climate-sensitive activities such as rain-fed agricultural production. In Kenya, where 80% of the population depend directly or indirectly on agriculture, major climatic events have included a series of prolonged droughts stretching back to the early 1990s, as well as El-Niño rains that resulted in major floods at the end of the last decade.

Most recently, during 2008–9, Kenya was hit by a severe drought, which led to widespread food crop failure. Resumption of rains in November 2009 after the lengthy dry spell facilitated some improvements in food security. Nevertheless, an estimated

3.8 million people remain food insecure, particularly in the Arid and Semi-Arid Lands (ASAL), since only limited harvests have occurred, while livestock have hardly recovered their productivity. In addition, the food pipeline has encountered substantial breaks, limiting its capacity to enhance food security in areas that have suffered a succession of at least four poor or failed seasons. Households in localised areas that have been affected by floods have suffered a marked decline in their food security.

These environmental changes create new burdens for those already poor and vulnerable, for whom risks of crop failure, food and income insecurity, malnutrition and ill health are experienced as interconnected and mutually reinforcing.



Source: FEWS Net after ALRMP and KFSSG (Jan 2010)

Understanding these dynamic processes is important when assessing proposed technological and policy solutions – such as stress-tolerant crop varieties, early warning systems and water-conservation measures – and the extent to which they address or exacerbate patterns of differential vulnerability between and within regions and social groups.

EXPLORING INNOVATION PATHWAYS

In the first phase of this study (2007–9), the STEPS Kenya team adopted a 'pathways approach' (STEPS Briefing Paper 2) and took maize as a window through which to examine farmers' and institutional responses to the experienced or anticipated effects of climate change, to the increasing volatility of input and output markets, and to the pressures of continuing land subdivision. This single-crop focus is less narrow than it would first appear, given the centrality of maize in Kenyan cultural, economic and political life. Maize has therefore served as an ideal entry point for engaging with a variety of stakeholders in different agro-ecological, socio-economic and institutional settings about the challenges they face and their perceived room for manoeuvre when dealing with those challenges. Moreover, given the ubiquity of maize in multiple, diverse livelihood systems across Kenya and elsewhere in Sub-Saharan Africa, national and international crop scientific institutions have responded with research into improved maize varieties more able to withstand the effects of drought and climate change (STEPS Briefing Paper 4).

Our field research has revealed that maize plays many different roles in diverse livelihood systems. Firstly, and most fundamentally, of course, 'maize is food'. It is the most important and widely consumed staple cereal crop, whether roasted or used as flour (*ungu*), across different regions, ethnic groups and social classes. Secondly, it can often be said that 'maize is cash'. Smallholder maize agriculture may not be profitable (in fact many small farms run at a loss, particularly if they factor in their own labour) but maize is one commodity in Kenya for which there is always a ready and accessible market. Harvested maize, for example, is often saved and used to pay school fees or to exchange for labour. Finally, for many poor farmers 'maize is insurance'. That is, with the uncertainties of weather, markets and politics, farmers continue to plant at least some of their land with maize 'just in case' it will be a good year, even if these only occur one or two in every five years, with the most recent short rains of 2009–10 a case in point.

In the second phase of research (2009–10), the STEPS team employed Multi-Criteria Mapping (MCM) (described in STEPS Kenya Briefing 3) to explore the potential and constraints of alternative 'pathways in and out of maize'. It started from an assumption that concerns about the effects of climate change potentially present an opportunity to open up the

debate about alternatives, both within maize agriculture (e.g. ones that might recognise farmer innovations, and informal as well as formal systems – STEPS Kenya Briefing 5) and out of maize, to other crop-based livelihood options (e.g. alternative dryland crops – STEPS Kenya Briefing 6; horticultural crops – STEPS Kenya Briefing 7).

Thus, in the second phase, fieldwork findings were distilled into a set of 'innovation pathways' (STEPS Briefing 3). These were used as the starting point for opening up discussions with a variety of key stakeholders on:

- 1 the range and type of pathways – envisioning alternatives or 'variants' within
- 2 relevant criteria for choosing one pathway over another in such a way as to factor in the cross-scale dynamics and constraints described earlier
- 3 critical examination of alternative visions of the future and governance arrangements needed to support and facilitate them.

Through this process we developed a typology of nine core 'pathways in and out of maize', focusing on lessons derived from Sakai, a risk-prone, low-potential area in Mbooni District, Eastern Province, where considerable effort has gone into fostering local adaptation responses to climate change by various agencies. Work was undertaken with key stakeholder groups – local farmers and officials in Sakai, and assorted climate change and agricultural specialists and policy makers in Nairobi – using MCM. Each group was asked to analyse the core pathways, alongside any others they wish to add, according to their own criteria, which were then weighted in terms of priority. This process enabled depth as well as breadth of analysis. While there was some initial analysis and immediate feedback of results during the MCM interviews themselves, the data have since been analysed in more detail. Some of the key findings are included in the set of briefing papers that accompany this overview. In addition, the results and policy implications will be presented at a national workshop in Nairobi and with key stakeholder groups in March 2010.

DIVERSITY AND RESILIENCE

Debates and uncertainty about the existence and effects of climate change present an opportunity to question established practices and confront received wisdoms about agricultural dynamics and food security in Kenya. This project has highlighted some of the challenges involved in facilitating the transition of farmers in ASAL areas from maize farming into crops that are better suited to complex, dryland conditions. However, as long as farmers remain uncertain about the reliability of markets for such produce, as well as the availability and affordability of maize and *ungu* for their domestic consumption, they

are unlikely to make such a shift. Furthermore, planting materials for root crops such as sweet potato and cassava are not attractive to commercial agro-dealers, so serious attempts to promote alternative crops would require a rethinking of the agro-dealer model, or at least the support of complementary extension channels, to disseminate such crops. Of particular concern, especially in the low-potential areas of Kenya, are the locally specific variations in the timing and intensity of rainfall that are especially difficult to forecast and cope with.

This study of environmental change and maize innovation pathways has stressed the need for institutional as well as technical innovations if current interventions are to enhance rather than undermine

resilience in the face of climate variability and uncertainty. Despite their use of a language of 'adaptation' and 'resilience', initiatives that rely on a linear 'pipeline' innovation approach (and its associated regulatory framework) remain locked into a risk-stability management model that is unlikely to match, let alone enhance, the adaptive capacity of households and communities in marginal environments. In particular, interventions focusing on strengthening and extending the formal maize system at the expense of local, informal systems are in danger of undermining those sources of diversity on which people in different localities need to draw if they are to build livelihoods that are both resilient to shocks and robust in the face of longer-term stresses.

ABOUT THE STEPS CENTRE

The STEPS Centre (Social, Technological and Environmental Pathways to Sustainability) is an interdisciplinary global research and policy engagement hub uniting development studies with science and technology studies. We aim to develop a new approach to understanding, action and communication on sustainability and development in an era of unprecedented dynamic change. The STEPS Centre is based at the Institute of Development Studies and SPRU Science and Technology Policy Research at the University of Sussex with a network of partners in Asia, Africa and Latin America and is funded by the Economic and Social Research Council.

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