More reading

Agri-food System Dynamics: Pathways to sustainability in an era of uncertainty, *STEPS Working Paper* 4 (2007), by John Thompson, Erik Millstone, Ian Scoones, Adrian Ely, Fiona Marshall, Esha Shah, and Sigrid Stagl (ISBN – 13: 978 185864 653 7)

Environmental Change and Maize Innovation in Kenya: Exploring pathways in and out of maize, *STEPS Working Paper* 36 (2009), by Sally Brooks, John Thompson, Hannington Odame, Betty Kibaara, Serah Nderitu, Francis Karin and Erik Millstone (ISBN: 978 1 85864 903 X)

Reforming the Global Food and Agriculture System: Towards a Questioning Agenda for the New Manifesto, *STEPS Working Paper* 26 (2009), by Erik Millstone, John Thompson and Sally Brooks (ISBN: 978 1 85864 783 5)

STEPS Briefings on Environmental Change and Maize Innovation Pathways (No. 1-7, 2010) by John Thompson, Sally Brooks, Molly Morgan, Erik Millstone, Hannington Odame, Francis Karin and Andrew Adwera.
See www.steps-centre.org/ourresearch/crops,%20kenya.html

Multicriteria Mapping (MCM)
www.multicriteriamapping.org

All our publications are available at
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Credits

This briefing was written by John Thompson and edited by Nathan Oxley.

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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Pathways in and out of maize

From the STEPS Centre project: Environmental change and maize innovation pathways in Kenya

STEPS project briefing

In a region where droughts and other extreme weather events are common, maize is central to food security for most households across East and Southern Africa. From national policy to individual households, maize security has come to be equated with food security. The resulting complex web of 'maize politics' directly influences both policy and families' access to food.

Consequently, concerns about maize production and access drive national agricultural research and development policy, leading to a virtual 'lock-in' to maize as the dominant pathway to food security. The ESRC STEPS Centre's maize project sought to identify and analyse alternative 'pathways in and out of maize' in the face of dynamic environmental, social and technological change.

Maize farmer, Sakai. Photo: STEPS Centre

Climate change and vulnerability

Climate change and variability present new research and development challenges in Kenya, where 80% of the population rely directly or indirectly on agriculture. Major climatic events, including a series of prolonged droughts stretching back to the early 1990s, mean that millions of people lack food security, particularly in the Arid and Semi-Arid Lands (ASAL), where harvests have been limited.

These environmental changes create new additional burdens for poor and vulnerable households, for whom risks of crop failure, food and income insecurity, malnutrition and ill health are experienced as interconnected and mutually reinforcing. 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 patterns of vulnerability or exacerbate them.

"Environmental changes create new additional burdens for poor and vulnerable households"

Analysing pathways in and out of maize

Initially, during 2007–9, the STEPS Kenya team adopted the Centre's 'pathways approach', using maize to examine how farmers and institutions respond to the experienced or anticipated effects of climate change, the volatility of markets and continuing land subdivision. Maize served as an entry point for engaging with stakeholders about the challenges they face and their perceived room for manoeuvre. Moreover, because maize is present in diverse livelihood systems in Kenya, national and international crop scientific institutions have researched maize varieties more resistant to drought and the effects of climate change.

Then during 2009–10, the team used Multicriteria Mapping (MCM) to explore the potential and constraints of alternative

Mango farmer, Sakai. Photo: STEPS Centre

'pathways in and out of maize'. It started from an assumption that concerns about climate change might create an opportunity to open up the debate about alternatives, both within maize agriculture (e.g. farmer innovations and informal as well as formal systems) and out of maize towards other crop-based livelihood options (e.g. alternative dry-land crops).

Our fieldwork findings were distilled into a set of 'innovation pathways' used as the starting point for discussions with key stakeholders on:

- **range and type of pathways** – envisioning alternatives or 'variants'
- **relevant criteria** for choosing one pathway over another, factoring in dynamics and constraints
- a critical examination of **alternative visions of the future** and governance arrangements needed to support and facilitate them

Key stakeholder groups were interviewed using MCM including local farmers and officials in Sakai, climate change and agricultural specialists and policy makers in Nairobi. 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 and well as breadth of analysis.

A typology of nine core 'pathways in and out of maize' was developed from the fieldwork in Sakai, a risk-prone, low-potential area in Mbooni District, Eastern Province, where considerable effort by various agencies has focused on fostering local adaptation responses to climate change (See Box 1).

Diversity and resilience

This study of environmental change and maize innovation pathways 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.

9 core pathways in and out of maize

1. Alternative staples for subsistence
2. Alternative staples for market
3. Local improvement of local maize seed
4. Assisted seed multiplication (alternative crops)
5. Assisted seed multiplication (maize)
6. Individual high-value crop commercialisation
7. Group-based high-value crop commercialisation
8. Commercial delivery of new maize varieties
9. Public delivery of new maize varieties

Climate change as an opportunity

Debates and uncertainty about the existence and effects of climate change in Kenya present an **opportunity** to challenge conventional wisdoms and established practices. This study highlighted some challenges in facilitating the exit of farmers in areas like Sakai from maize farming into crops more conducive to dryland conditions. As long as they remain uncertain about the reliability of markets for such produce, as well as the availability and affordability of maize and unga (flour) for their own home 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.

"Debates and uncertainty about climate change in Kenya present an opportunity to challenge conventional wisdoms"

Maize on film

The STEPS film "Seeds and Sustainability: maize pathways in Kenya" brings together a cast of characters including a farmer, a scientist, a regulator and a seed policy analyst. It shows how changes underway could have serious impacts on farmers struggling for sustainability in a changing climate.

Watch online at www.steps-centre.org/films