changing farming for a changing climate

Adam Smith International

UKaid from the British people

INFORMATION BRIEF:

Transformational Adaptation to Climate Change:

Concepts, Examples, and Relevance for Agriculture in Eastern and Southern Africa

This information brief highlights key findings in the Vuna report "Transformational Adaptation to Climate Change: Concepts, Examples, and Relevance for Agriculture in Eastern and Southern Africa," by Nick Brooks (November 2016). Online: http://www.vuna-africa.com

Key points

- Climate policy commonly carries an implicit assumption that incremental improvements in agricultural systems are adequate to make them resilient to climate change.
- In some cases, however, agricultural systems may cross certain environmental thresholds that require more transformational adaptation.
- Governments and development agencies need to improve their understanding of climate thresholds and their preparedness for transformational adaptation.
- Climate smart agriculture frameworks should consider the piloting of strategies for transformational adaptation.

Defining agricultural adaptation

The latest report from the Intergovernmental Panel on Climate Change (IPCC 2014: 1758) defines the two types adaptation:

- **Incremental:** "Adaptation actions where the central aim is to maintain the essence and integrity of a system or process at a given scale."
- **Transformational**: "Adaptation that changes the fundamental attributes of a system in response to climate and its effects."

Most existing development interventions have been incremental, aiming to build the resilience of existing systems. Climate change, however, may result in the crossing of critical climatic or environmental thresholds, beyond which existing

systems are not viable even where incremental adaptation is pursued. Where this occurs, transformational approaches will be required (Brooks et al. 2011; IEG 2012). These are likely to involve the replacement of current systems and practices with alternatives that are better suited to new or emerging climatic conditions, for example transitions to different types of crops or cropping systems, or even transitions from cropping to livestock keeping. The need for transformational adaptation will increase as climate change accelerates over the coming decades.

Identifying vulnerable areas

Transformational adaptation may be required as a response to transformational changes in climatic and environmental conditions. The IEG (2012) provides the following examples of such changes:

- Salinisation of freshwater supplies in coastal areas
- The disappearance of glaciers and mountain snow packs, resulting in winter floods and summer droughts in the watersheds below
- Shifting of climatic zones polewards and to higher elevations, causing a region's traditional crops to become unviable
- Loss of biodiversity-rich ecosystems that cannot migrate as climatic zones shift

More specific thresholds may be identified in agricultural production systems. For example:

- Rising temperatures that require changes in the types of crops produced
- A combination of temperature and rainfall changes that encourage a shift from cropping to livestock production
- Rising sea levels that require communities to be relocated and possibly transition out of agricultural production

The key challenge is identifying the moment when these thresholds appear. Much depends on the adaptability of agricultural systems, sometimes referred to as their "coping range"—the range of conditions that a system can accommodate without significant or lasting disruption, bounded by critical thresholds beyond which the system is compromised (Figure 1).

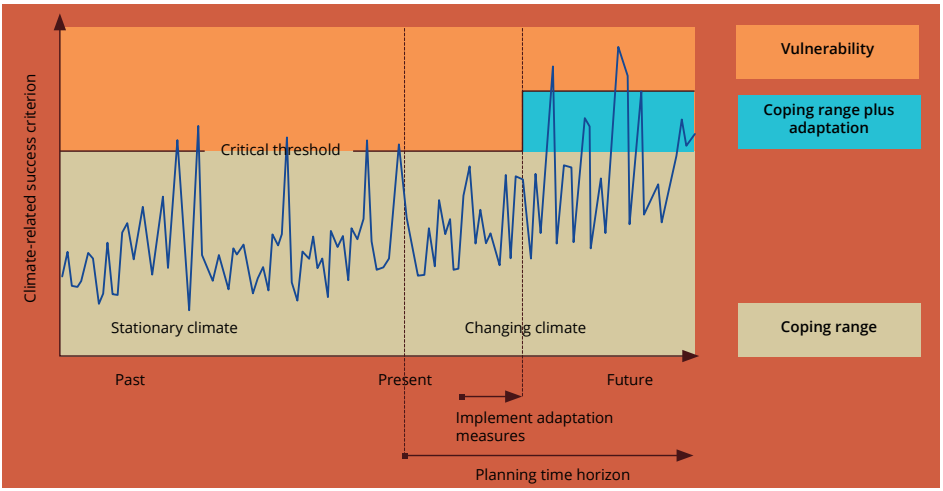

Figure 1: Illustration of the concept of the coping range, defined in this hypothetical example by a critical threshold in a notional climate variable, beyond which a system experiences disruption. Climate change may increase the frequency at which the critical threshold is breached. (Reproduced from European Commission, 2013.)

The coping range may be enlarged by the adoption of a range of climate smart practices such as more temperature- and drought-tolerant varieties, or more efficient water management techniques. At some point, however, the farming system meets a critical threshold beyond which it is no longer viable. Instead of switching crop varieties, farmers must plant a different type of crop, or shift to livestock, or transition out of agriculture altogether. Examples of such charges are cited in case studies for northern Nigeria, eastern Niger, and northern Mali. Read more on these case studies in the report: Transformational Adaptation to Climate Change: Concepts, Examples, and Relevance for Agriculture in Eastern and Southern Africa loacted Online: http://www.vuna-africa.com

The key challenge is to extend discussions of climate smart agriculture beyond the pursuit of incremental adaptation.

Transformational change as driver of action

Better understanding is needed of the critical thresholds for agriculture in Eastern and Southern Africa. Such knowledge will allow both the prioritisation of adaptation measures needed to expand the coping range and the planning for possible transformational adjustments. Rippke and colleagues (2016: 1) propose three overlapping phases of adaptation:

1. "An incremental adaptation phase focused on improvements to crops and management"
2. "A preparatory phase that establishes appropriate policies and enabling environments"
3. "A transformational adaptation phase in which farmers substitute crops, explore alternative livelihood strategies, or relocate"

Transformational adaptation cannot simply be mandated. There are considerable barriers to prescriptive transformation, including uncertainty about both climate change and the likelihood thresholds will be breached; lack of resources for planning and implementing adaptation; institutional constraints such as fragmented decision-making; legal barriers; and disagreements about resource rights. There is a need to create an enabling environment for transformational adaptation. This may encompass the creation of institutions for better tracking of thresholds, the piloting of transformational responses, and the promotion of participatory discussions of the problem and potential solutions.

The key challenge is to extend discussions of climate smart agriculture beyond the pursuit of incremental adaptation to incorporate consideration of the additional need for transformational adaptation. In a conference organised to discuss these findings, participants highlighted the need

for continuing work to define thresholds of transformational adaptation, and to identify ways in which these thresholds might be 'pushed back' through technological, market, policy, and other interventions (Vuna, 2017). However, the conference also noted that the transformation of agricultural systems is driven as much by changing population pressures and market conditions as by changes in climate. Some of the largest transformations in livelihood strategies in Eastern and Southern Africa have occurred as a result of the construction of new roads and the opening of new markets. A better understanding of how farming systems are already transforming in response to evolving socioeconomic opportunities can inform the preparation of transformational adaptation strategies to respond effectively to climate change.

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