Weathering and halting the perfect storm: food system solutions

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Abstract

While the challenges of achieving the Sustainable Development Goals in low-income countries are immense, there are opportunities for significant advances and transformations, related to rising urban populations and changing food demands, digitalisation of the food sector, new ways of connecting farmers, and creative financial models. Climate risk management will need to be at the core of future initiatives. Several elements will need to come together to achieve the desired transformation, including meaningful policy and governance change, deepened private sector engagement with smallholders, and significant advances in digitalisation. Through such means, both adaptation and mitigation in agriculture can be tackled.

My focus is on smallholder agriculture. First, I'll address the mega challenges facing the food system. Then I will inspire you with the progress we are achieving, before ending with a sober reflection on what we need to do to achieve food system transformation.

The predictions for climate change impacts in Africa really frighten me. I am from Zimbabwe, which is shaded almost entirely in dark grey in the map (Figure 1) of places in sub-Saharan Africa where the lengths of growing seasons are forecast to change as the world warms. In the grey areas, seasons will be shorter than they are now if average air temperatures exceed 4°C above pre-industrial levels. Many parts of Zimbabwe are already really tough to farm, but

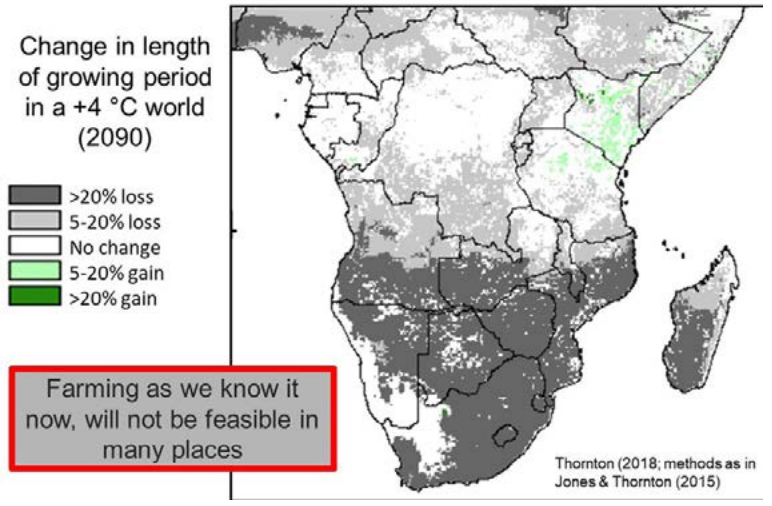

Figure 1. Shortening growing seasons pose a mega-adaptation challenge.

This paper has been prepared from a transcript and the illustrative slides of the presentation.

farming as we know it in those kinds of areas will just not be possible if growing seasons shorten by 20% or more. This kind of scenario would apply to my children's children at least. Even now, the number of record-breaking monthly temperature extremes is five times more than if the world wasn't warming (Coumou et al. 2013).

Putting that in another way, record-breaking events in sub-Saharan Africa in terms of drought have increased by up to 50% already (Lehmann et al. 2018). In some places in the world, we have only 11 growing seasons left to reach 500 million smallholder farming households, and the task of reaching those – in terms of building resilience – is enormous. As Figure 2 shows, we have to do something within the food sector to reduce greenhouse gas emissions because reductions in other sectors will not be enough. Yet with current technologies agriculture can only achieve 20–40% of the reductions needed. This is a massive adaptation challenge and a massive mitigation challenge.

In the areas of the world that we (CCAFS) work, we have undertaken household surveys of 1000s of individuals (Figure 3). Farmers have been classified as stepping up (they're intensifying); stepping out (they're doing something new including growing assets to exit agriculture); hanging in or coping. In the areas where we work, which are perhaps the tougher areas of developing countries, it's only 15% that are stepping up. In some parts of the world, up to 70% of farmers are just coping, living at the poverty level, or below the poverty level. Even worse (last column of the table), up to 30% of farmers are scraping by with many months of deficit.

Figure 4 depicts how climate risk is a key driver of poverty and food insecurity in two different dimensions. Uncertainty is driving lack of both investment and adoption; it will deplete your assets. And in extreme events farmers try to protect their productive assets. For example, in drought in a mixed farming area,

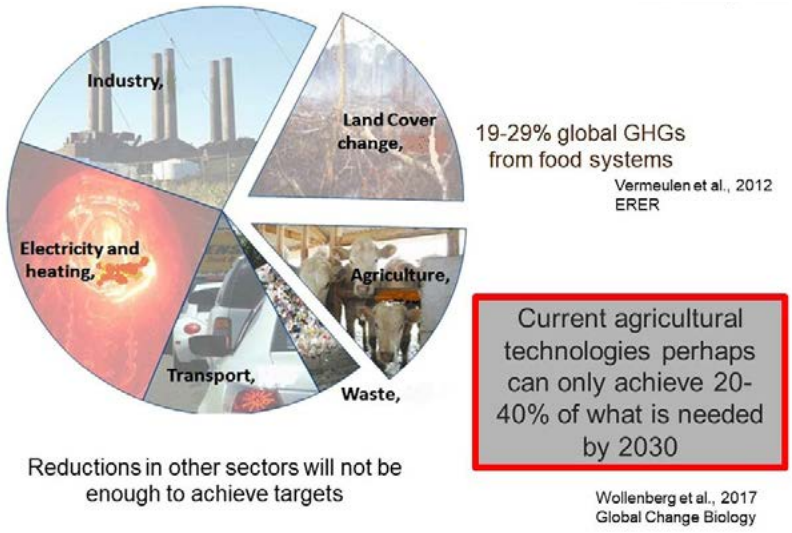

Figure 2. The mega-mitigation challenge. The imperative for food system solutions.

Figure 3. Householders in the poorer areas of the world are taking action.

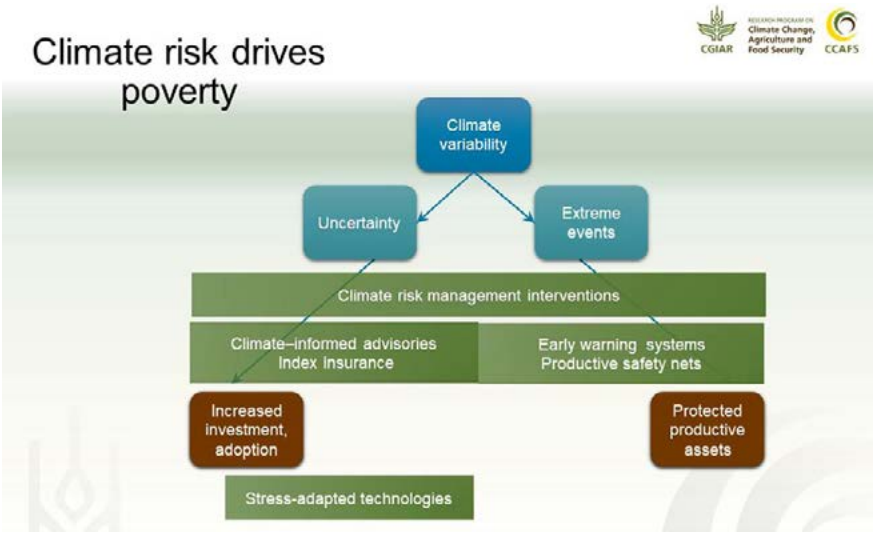

Figure 4. Climate risk drives poverty, through both uncertainty and extreme events.

farmers will sell off their livestock in order to cope with a coming season, though those livestock would otherwise be crucial in the next production system.

Therefore, CCAFS focuses heavily on climate risk management interventions. Farmers get seasonal advisories to know what they can do in the coming season. And there are insurance-type methods available to protect farmers from bad years. There are wonderful things happening in terms of different kinds of climate risk management interventions, to help farmers protect their productive assets. We also have data showing how, if farmers are able to cope with risk, they will also then start adopting stress-adapted technologies.

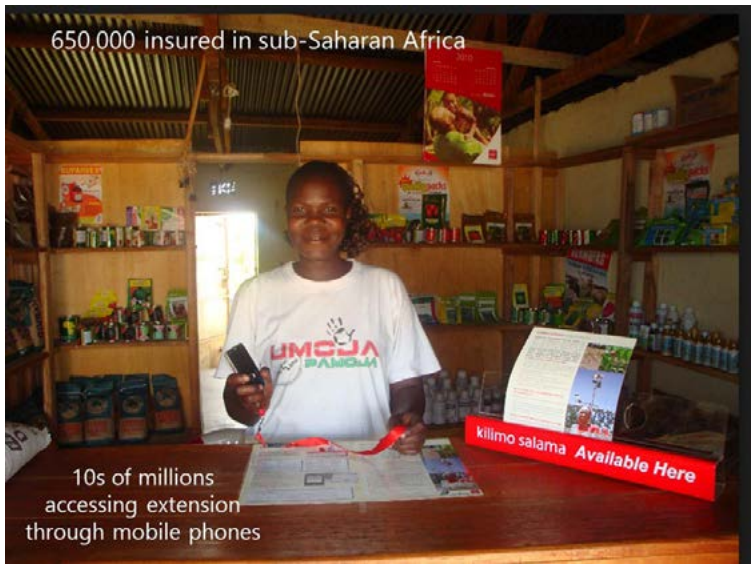

Figure 5. A rural shop in Africa offering banking and insurance services via mobile phones, as well as groceries.

Achievements helping farmers withstand climate change

Here are four examples of the kinds of things that are possible.

There are now more than 100 varieties of *drought-tolerant maize*, available to 2 million smallholders in 13 countries. Also, plant breeders are producing heat-tolerant wheat – something that will be useful to many Australian stakeholders as well. These stress-tolerant cereals are available and being widely adopted, thanks to the work of researchers at CIMMYT, IITA, universities, government and institutions' labs, and private industry.

The development of *mobile banking* has given farmers easy access to drought-insurance products. Farmers in a rural area with a cell phone can take out insurance at the local shop (e.g. Figure 5). They can take a photo of a barcode, apply for the insurance and pay for it immediately via their mobile device. The insurance products are related to climate indexes, and when, say, the rainfall in the local area goes below a certain amount the insured farmers get instantly paid out on their mobile device. Something like 650,000 farmers are insured in sub-Saharan Africa; it's really positive.

Further, tens of millions of farmers now are accessing *agricultural extension services through mobile phones*. It appears mobile devices can lead a revolution.

Third, *climate-informed advisories*. Esoko, which 'provides digital solutions and services for agriculture and data collection, to empower rural populations and the organizations that work with them', working with ICRISAT, has put together

CIMMYT: International Maize and Wheat Improvement Center
IITA: International Institute of Tropical Agriculture
ICRISAT: International Crops Research Institute for the Semi-Arid Tropics

a collection of private and public partners, and after a few seasons of R&D they now have 300,000 smallholder farmers in remote northern Ghana who are willing to pay for climate-informed advisories.

Fourth, a move that really cuts across the energy, water, food nexus. In India, farmers are *selling solar-generated electricity to the grid, and selling water to other farmers*, to acquire more secure irrigation water for themselves. This has positive greenhouse gas implications, when you look at the greenhouse gas emissions from the system, and if you get the incentives correct in their choice between using their solar-generated power to over-pump or selling that extra power to the energy company. The Indian Government has made a USD 21.5 billion investment in this, rolling out 2.75 million solar irrigation pumps.

What about in Africa? Only 5% of cropland in Africa is irrigated at the moment, while the global average is 20%. Can solar power and energy insurance-related models leapfrog the traditional irrigation models?

As well as these great examples, I can think of perhaps another 20 positive initiatives out there. But in fact fewer than 20% of small-scale farmers are stepping up, changing, getting out of poverty – and we have to reach 500 million farming households within a decade if we're serious about achieving the SDGs!

Our theory of change

We are working with multiple partners to try and achieve the changes needed, as outlined in Figure 6. One aspect is technologies, but I think that is under control. Another is finance. Consider the differences between the finance in the world's development communities and the world's investments communities. How can we bring extra public and private sector investment into smallholder farming? And why has it not happened already?

At CCAFS we believe the whole food system is important, and that there is a big opportunity to reshape the way food systems operate. It will involve reshaping supply chains, thinking about food retail marketing and procurement issues, as well as changes to food loss and waste, and to production systems.

We need to empower farmers and community organisations, including women and youth: we have seen some amazing impacts when farmers and local communities can network and change behaviour, enabling them to stand up to the powerful corporate players – to *demand* services.

The last piece of this circle (Figure 6) is digital and, as I have said already, this can really drive a revolution. There is a massive 'connectedness' happening. How

Figure 6. Aspects that need attention to achieve a food system transformation.

can it act as a force of change? Agriculture in the US, for example, is the least digitalised sector of that economy.

And as shown in the centre of Figure 6, the core need to achieve food system transformation is for *policy and institutions to be fostered and engaged*. Therefore, at CCAFS, as a program, we have decided we will not work in places where we do not believe there is serious government commitment to change.

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