

# Farms of the Future: *Synthesis report*

## An innovative approach for strengthening adaptive capacity<sup>1</sup>

African farmers, rural communities and other agricultural stakeholders urgently need to respond to changing climates through adaptation. The ‘Farms of the Future’ approach can be used –together with participatory action research activities - to increase farmer and other stakeholders’ awareness of climate change and possible solutions. This report provides a synthesis of findings from Tanzania and Ghana.

*R. Lamboll<sup>1</sup>, V. Nelson<sup>2</sup>, and N. Nathaniels<sup>3</sup>*

### 1. Introduction

Farming and food systems are facing growing and unprecedented pressures from climate change, climate variability and environmental degradation, alongside increasing and changing population demands. The trend and magnitude of change will surpass the limits of local knowledge. This means that new knowledge and means are needed to strengthen adaptive capacity, but this requires new approaches to learning, because of the uncertainties inherent in climate change and the need for responses to be tailored to local realities. This uncertainty means it is difficult to understand in real terms what the climate of a particular area will be in the future and how communities may respond. This forms a real challenge to developing meaningful adaptation practices, technologies and policies.

The Farms of the Future (FoTF) approach was originally conceived by a Climate Change, Agriculture and Food Security (CCAFS) team to strengthen farmer adaptive capacity and comprises two main elements: i) climate modelling using a newly created CCAFS climate analogue tool (see Box 1 below) to identify possible climate analogue sites; ii) farmer exchanges with itineraries based on the climate analogue tool findings. The visits would support visiting farmers to build a mental picture of what their climate and farming systems might look like in the future. In other words farmers could learn from what those living in the analogue site do now, and use this knowledge to test specific cropping systems and technologies in their own community, either now or in the future. NRI and partners were commissioned to test this approach in East and West Africa to see if it could be a valuable option to strengthen farmers’ capacity to adapt to climate change. Tanzania and Ghana were selected as the countries where the approach would be piloted. This report presents the key research findings.



*Farmers recording their views on future scenarios for their community and landscape*

### Key Messages:

- **The Farms of the Future approach piloted in Tanzania and Ghana comprises a climate analogue tool, farmer and stakeholder study tours, participatory video and a focus on experiential learning**
- **The climate analogue tool is most useful as a *learning* tool, rather than a predictive one;**
- **Study tours or learning journeys are a valuable tool for programmes seeking to strengthen farmer adaptive capacity.**
- **The extended Farms of the Future approach can support adaptive capacity strengthening by sparking reflection on future horizons & giving farmers the opportunity to learn from their peers about technological & institutional adaptations;**
- **Such an initiative is most likely to be effective if embedded within a participatory action research process.**

<sup>1</sup> <http://ccaafs.cgiar.org/>

<sup>2</sup> Livelihoods and Institutions Department, Natural Resources Institute, University of Greenwich

<sup>3</sup> Independent Participatory Video and Development Specialist and NRI associate

### Box 1: CCAFS Climate Analogue Tool

The analogue tool (Ramirez et al. 2011) connects sites with statistically similar climates ('analogous'), across space (i.e. between locations) and/or time (i.e. with past or future climates). It allows users to find areas that in the future will have a climate that is possibly similar to the current climate of a farming community. It can also help to identify locations which currently have a climate similar to the projected future climate of a farming community.

<http://www.ccafs-analogues.org>

## 2. NRI's approach to Farms of the Future

The NRI project had two key objectives:

- To devise, test and validate the "Farms of the Future" approach built on farmer-to-farmer exchanges to analogue sites as a valuable option to improve adaptive capacity and support knowledge transfer.
- To improve understanding of local practices and available tools for enabling change, as well as cultural, economic, or institutional obstacles to such adaptive change.

Several additional components were proposed by NRI to extend the CCAFS Farms of the Future approach. These were:

- Prioritizing an experiential approach to learning (i.e. about experience and reflection processes, rather than more instrumental approaches);
- Undertaking a learning *journey* study tour, rather than a single location to visit various places with differing characteristics (including climate analogue sites);
- The inclusion of other learning opportunities and/or similar social and environmental contexts as criteria for selecting study tour locations;
- The participation of other agricultural innovation system (AIS) stakeholders in the study tours;
- Integrating the use of participatory video to enable farmers (and other AIS actors) to document their own insights and share with their communities;
- Participatory three dimensional modelling prior to the study tour in the CCAFS communities to investigate climate and other socio-ecological change;
- Training farmers to document the study tour using video and sharing this with their own communities.



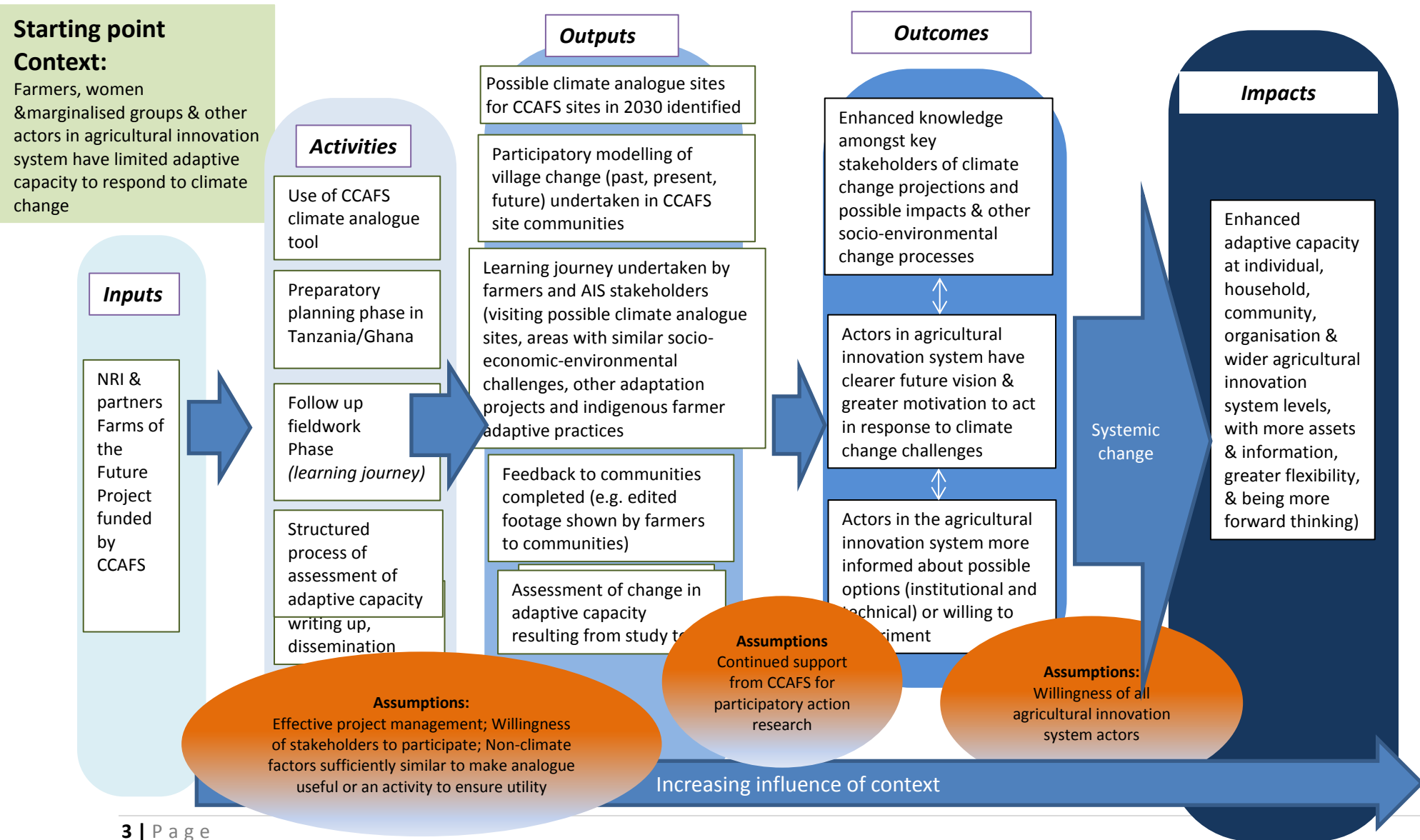
*Doggoh farmer (Ghanaian) recording a Burkinabe farmer's description of his farm and farming practices, Burkina Faso*



*Watching the farmers' study tour video back in the community*

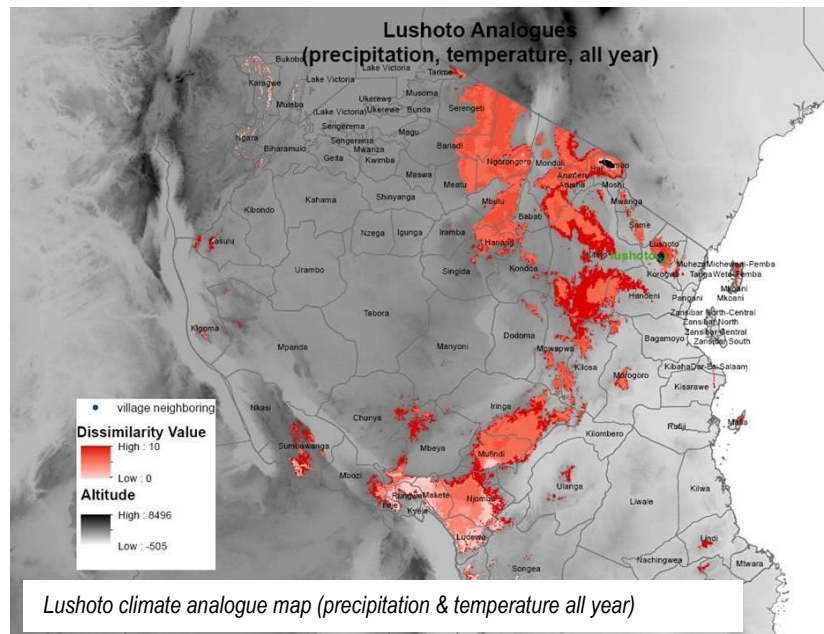
The theory of change for the NRI project can be visualized as follows – see Figure 1 below.

**Figure 1: NRI Project Theory of Change for Farms of the Future**



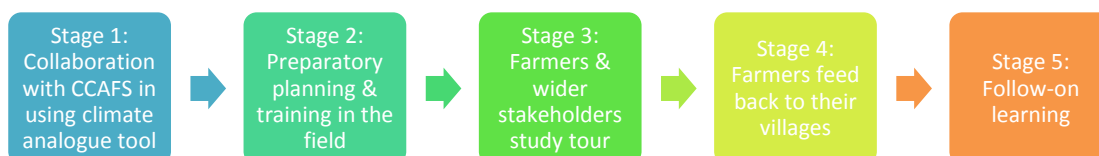
The key activities undertaken in both Tanzania and Ghana were as follows

- Interaction with the CCAFS climate modelling team, using the climate analogue tool to identify potential sites to implement the farms of the future approach;
- Participatory 3D modelling with farmers in two selected CCAFS villages at CCAFS sites as a tool to facilitate exploration of village change (social, environmental, climatic etc) over past decades and plausible future scenarios;
- Selection of farmers from two CCAFS villages at CCAFS site and choice of study tour/learning journey visit sites using climate analogue information, but also informed by known learning opportunities (e.g. existing climate change adaptation projects, indigenous practices elsewhere in the country or region) and similarities in socio-economic/environmental conditions;
- Involving broader stakeholders (e.g. District Extension Officers, NGOs, agri-input stockists together with agricultural researchers) from the agricultural innovation system (AIS) during the whole process;
- Training of study tour farmers in how to operate user-friendly video cameras, including creation of two 'village change' videos in Tanzania;
- Facilitation of a climate learning journey with a bus trip to a range of learning sites a) from north-east to south-west Tanzania and b) from north-west Ghana to southern Burkina Faso.
- Video recording by farmers of the visit to document learning insights;
- Sharing of experiences using rapidly edited videos in reflections with CCAFS communities back at home in their villages at CCAFS site;
- Tailoring of an adaptive capacity framework to support analysis;
- Participatory evaluations of learning during the study tour by farmers and other AIS actors providing information for the team to analyse adaptive capacity building;
- Capturing the process throughout, writing-up of country reports and journal article by the project team, and sharing of edited videos as appropriate



Some of these activities were on-going throughout the project (e.g. facilitating farmer learning), whereas others were undertaken at a particular point in the project cycle (e.g. the modelling of village change or the pre-study tour assessment).

Figure 2: Farms of the Future process

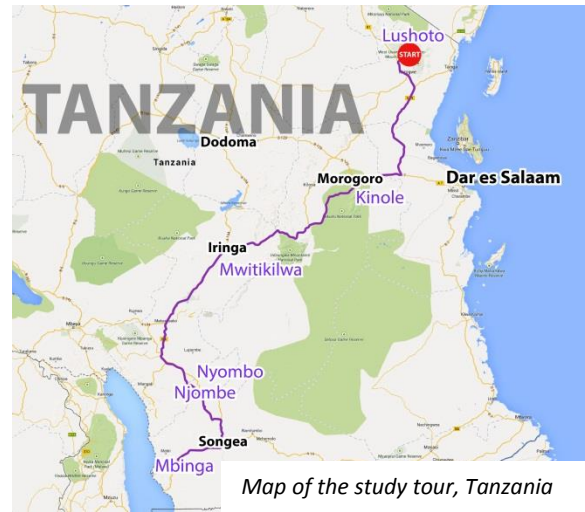


### 3. Key findings and lessons

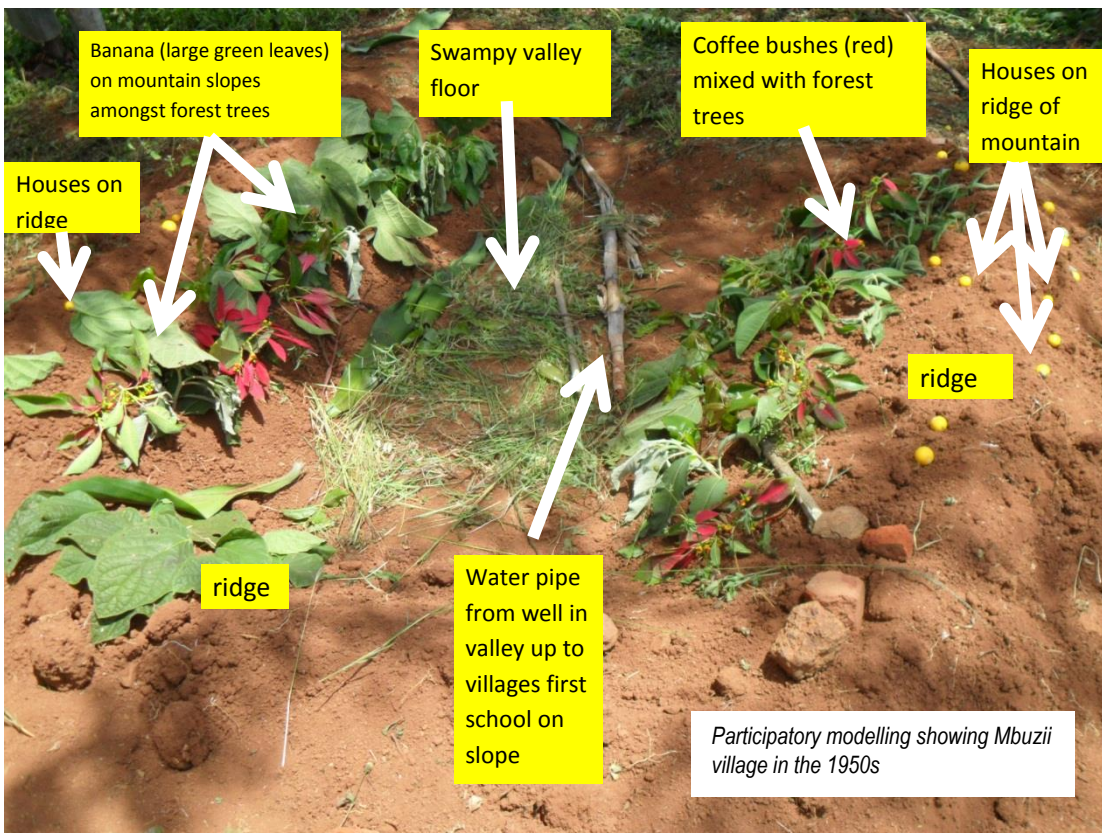
#### 3.1 Tanzania

Fifteen farmers and five key agricultural stakeholders from Lushoto district in the Northern highlands took part in a 10-day learning journey to several analogue learning sites culminating in Mbinga district in the Southern highlands. In an initial planning workshop a wide range of agricultural stakeholders were invited and during the discussions the group identified the agricultural stakeholders who would participate, with a spread chosen from public, private and third sectors. In the planning phase two villages (Mbuzii and Yamba) had been selected from the Lushoto area in which CCAFS are working, based on specific selection criteria (e.g. overall wealth/poverty, farming system).

In both Mbuzii and Yamba villages a participatory exercise was facilitated in which farmers were invited, in separate groups of women and men, to build three dimensional models of their community/landscape, using local materials, and exploring the past, present and future. The three dimensional character of the models is important because it allows farmers to more clearly represent their area, which in Lushoto is an upland region. Some of the farmers were also shown how to film this exercise using an easy-to-use video camera. This exercise facilitated discussion of changes in the landscape, livelihoods and climate, including a range of possible future scenarios.



Map of the study tour, Tanzania





CCAFS site landscape, Lushoto district, Tanzania

Following this exercise, farmers were selected from the participatory action research groups which were already working with CCAFS. Criteria for selection were an equal balance of women and men was requested and identifying individuals who had already demonstrated an aptitude and interest in filming in the three dimensional participatory modelling.

Farmers visited both technical and institutional adaptations in the learning journey study tour. In the farmer evaluations of the study tour, the main highlights included the following: Seeing and having a go at creating **Matengo pits** – a traditional soil and water conservation method in Mbinga District (the analogue site) was very popular. The participating farmers were keen to use and adapt this method for use in their own area. They were impressed with the **tree planting** which they saw on the journey. Land scarcity in Lushoto means that their ability to plant trees is fairly limited, but nonetheless interest to act to protect water sources, conserve soil and support reforestation was refreshed and strengthened



Demonstrating Matengo pits to visitors, southern Tanzania

*“The things which impressed us were the formation of the SACCOS, planting of trees, production of improved coffee, ngoro farming and bee keeping. The challenges are training and capital’ (Lushoto farmer, Tanzania)*

The study tour farmers in their evaluations of the study

tour also rated a **savings and credit scheme (SACCOS)** highly, and they plan to establish these in their own communities. They were appreciative of the collective action which they had heard about in relation to this scheme which could also be beneficial in multiple ways to spur greater action: seeing a successful scheme in operation is valuable. However, overall success may depend on follow-on support. Similarly, the Mbinga **farmer field school group** impressed

the visiting farmers, because of what they had achieved with the **coffee nursery** amongst other things. **Community managed weather stations** were also positively appraised. **Beekeeping, fish rearing and new avocado tree** varieties are examples of other innovations that were highly valued by the participants.

Other agricultural stakeholders (e.g. district extension officers, NGOs, community development staff, traders) said that the study tour had been valuable for them and raised their awareness on climate change challenges ahead. However, land scarcity in Lushoto may mean that with climate change and other pressures on smallholders, exit from agriculture becomes a necessary adaptation strategy. A degree of **livelihood diversification** is important to attract and retain the next generation in farming, but for some outmigration may be the only option.

*Another thing which we have seen and been impressed by is the equipment for measuring weather conditions. This equipment is good because the farmer can know the changes in climate and how s/he should start be altering cultivation or planting' (female farmer, village Lushoto, Tanzania).*



Host farmer in Njombe district, southern Tanzania explains to Lushoto district visitors how their weather station works and the visitors capture this on video.

### 3.2 Ghana

The Ghana study tour involved participants from the communities of Doggoh and Bompari villages. These two villages are located in Lawra and Jirapa Districts – the both of which comprise the CCAFS site. Other public and NGO sector stakeholders working at the Lawra-Jirapa CCAFS site were also invited to participate. The one-week study tour was undertaken to Leo and Po, in south-west Burkina Faso. A total of 18 farmers (i.e. 9 each from Doggoh and Bompari in the Lawra and Jirapa Districts respectively) and 7 other agriculture stakeholders participated. The breakdown of 25 participants by gender was 18 men and 7 women.

The participatory three dimensional modelling undertaken in Tanzania was also conducted in Ghana. It was useful for rapidly unpacking some of the major trends affecting the villagers' communities from their perspectives – including rivers becoming more seasonal, ponds drying up earlier, silting of the local dam. A



Ghana to Burkina Faso, study tour map



Lawra-Jirapa CCAFS site landscape, Ghana

reduction in tree cover and pasture was reported, as well as soil degradation, although more tree planting and soil conservation measures were mentioned as possible mitigating strategies. Changes have also occurred in cropping with less rice, millet and sorghum being grown, while white maize has increased. Cattle ownership has decreased – previously Fulani pastoralists managed the cattle for example. Currently men rear sheep and women rear pigs. **Interestingly there was a difference in what men and women farmers said would be likely to happen in the future in terms of agriculture: Women anticipated that they would have the same crops and livestock in the future, but declining productivity, whereas men expected expansion of cereal-legume production, sheep and pig production and moringa leaf processing for sale.**

**Farmers reported that their climate is changing.** For example, the rainfall period is becoming shorter and more erratic, but they were unclear on the causes, with many associating climatic changes with localized tree cutting. Farmers discussed rainfall as the main aspect of a changing climate, followed in some cases by rising temperature. There are

also concerns about environmental degradation more broadly, including soil degradation. During the study tour agricultural stakeholders made more reference than the farmer participants to climate change (especially mitigation). It is not clear that the study tour helped farmers to gain an understanding of the *global causes* of climate change, although awareness was raised of the changes in the climate and discussions held of what the projections say. **Discussion on causes and impact tended to revolve around the local scale.** However, reflections by stakeholders indicate that they are to varying degrees starting to grapple with the implications of these local-global interactions and how to address both adaptation and mitigation goals. Farmers in Doggoh are already aware of the environmental changes taking place in their community, including the loss of trees and other natural vegetation, soil degradation, changing rainfall patterns and links with agriculture and water sources. There was some indication by farmers that the study tour helped them to reflect even more on their own situation and possible conservation measures that could be applied – although agricultural stakeholders were more adamant on these matters.

Water management is a key issue in Doggoh and Bompari communities and their associated districts and **drip irrigation was a popular innovation amongst the visiting farmers** and other agricultural stakeholders. Keeping tree seedlings – the example visited in Burkina Faso - alive during the dry season can be a big challenge, which this technology can help to cost-effectively address. Various combinations of organic and inorganic fertilizers were observed by the visiting farmers – most of which do not currently apply any fertilizers or if they do are only using inorganic fertilizers, so the composting and manure observed made a significant impression, although land, labour, and livestock related constraints were also mentioned in relation to several of the innovations viewed. Some of the individual farmers visited were relatively well-off, with larger areas of land and the ability to hire labour – something that the visiting farmers cannot necessarily do.

**Most of the farmers we visited were practicing various combinations of agroforestry, intercropping, crop diversification, crop rotation and planting of legumes.** In many or most cases the crops were already known to the visiting farmers, but how they were combined, attracted a lot interest from the visitors – both farmers and agricultural stakeholders. The **possibility of commercializing jatropha and intercropping with other crops such as sweet potato, and in combination with livestock keeping, was identified as being new to the visiting farmers.** The commercial potential of jatropha was new to the visiting farmers, some of who may grow jatropha to keep out livestock, but none of whom were aware of its potential use for sale for fuel for the domestic market and there was even some discussion of establishing trading links between the two sets of farmers. **Two aspects of sweet potato cultivation made an impression on farmers and other AIS stakeholders. Firstly, the scale of production and secondly, the reported health benefits of orange flesh sweet potato. One of the farmers visited was growing a very large area of soya bean.** The various benefits of soya were reported by farmers and AIS stakeholders including medicinal properties and for protein.



*Burkinabé farmer shows how to place the drip irrigation technology he adapted to be more livestock proof alongside a cashew tree seedling.*

Improving farmers' access to innovations from elsewhere is important, but improving **farmers' ability to innovate themselves can be even more important in terms of adapting to climate change.** One particular farmer visited demonstrated his ability to innovate, and this encouraged the visiting AIS stakeholders and farmers – although again this farmer has more substantial resources at his disposal, but the visitors felt it was something to aspire to.

**The farmer field school approach to learning was positively viewed by the visiting farmers, as it is based on experiential learning and successes were demonstrated by the host farmers in the new technologies they were trying.** On several other occasions other AIS stakeholders commented on the importance of 'learning by seeing and doing', and commented that agricultural extension officers in Ghana could learn from this. Leadership was

said to be very important – the visiting farmers observed how the President of the farmers' smallholder association which they visited, was leading the members through demonstrating and sharing lessons from his own farm, being approachable and supportive of others.



Both Fédération Nununa, the women’s association that is processing and marketing shea butter and making added value products (and is also Fairtrade certified) and the Groupement Wend-Panga, based in Leo, involved in cassava processing, were both given extremely positive appraisals by the visiting farmers, with many remarking on their

organisational development, and collective enterprise and unity – both appeared to inspire the visiting farmers to act on return home.



Ghana farmer recording Groupement Wend-Panga small-scale cassava processing

interest and learning for the visiting farmers centred on rural transport solutions – namely the **use of donkey carts by women** to travel to the farm, collect water and carry produce – as women in Bompari and Doggoh do not have access to such transportation, and developing access would be a significant boost to household livelihoods, saving time and drudgery for women. Interestingly, the women visitors commented that their husbands should now consider this for them.

An **unexpected area of**



Donkey carts are important for rural and urban transport in south-west Burkina Faso, particularly for women

In terms of **gender issues**, representation of women on the study tour was limited at the outset and lessened during the course of the study tour by illness. The visiting farmers – female and male – and other AIS stakeholders were very positive about the success of the female agri-businesswoman they had visited, and the women’s collective processing groups – inspiring a stated intention to act amongst the visitors.

**The study tour was successful in motivating farmers to act** – although only follow-on support and monitoring can support this process and ensure that it is happening. **Farmers and agricultural stakeholders were both positive, indicating that they had learned new institutional and technological practices and innovations, and were keen to make changes on return home. In some cases farmers learned that it is important not to rely on government for support, but there were also calls for greater action from government.** There is clearly significant potential to building upon this momentum if a strong partnership is developed between different members of the communities, local and national AIS actors and CCAFS management.

Collective action is a critical element of successful development – according to the farmers’ reports. There were positive appraisals, in particular, of the women’s processing groups. **The female agri-businesswoman also served as a role model, sparking several male farmers, including the chief of one of the Ghanaian villages, to say that they had changed their minds about the possible role of women in farming and business.** It is not possible to say that comments like these lead to immediate change on return home – this probably requires on-going facilitation and reiteration, but it does show the importance of travel in encouraging participants to challenge their own accepted social norms and considering change.

**Overall, the study tour, which was only for a limited number of days, was successful in focusing discussions on climate change, on agriculture and livelihoods and the environment – now and in the future. It provided the visiting**

*“All that we have seen, heard and learnt..when we go back home and we are saying it with our mouth the people will not believe us ,but once it is captured in the video and shown it will even attract a lot of people to watch and believe as is being shown to them. So after visiting some farms what I will want in the video is jatropa farms because we did not know its importance” (Ghana participant).*

*“I think in Ghana too we are not doing bad at all but there are some few things that we learn from you people and also will to what we were doing in Ghana. I like the way you normally do not stick one crop cultivation but always cropped different type crops on a piece of land so that if this one failure the other one will may not fail and you have also to taking farming as a business and also planting a lot of trees unlike place because it is there we continue cutting it down without planting and our is becoming like a desert we learn that your place was a desert but that is not the picture we are seeing here. We have realised that the rains patterns have challenge unlike the first time it used to rain early for us to start farming but now it come five to the sixth month of farming season so this actually affecting us a lot”*  
Farmer from Doggoh, Ghana

**farmers with a valuable opportunity to learn from other farmers in Burkina Faso.** This provides momentum which can be built upon within the overall participatory action research process – something which is critical to the success of the study tour. Without this follow-on process, in which the study tour is embedded, it is less likely that the motivation and momentum could be capitalized upon. Of course, farmers may decide to take action themselves, but it is also likely that they will require some seed funding and technical support – for technological or institutional innovation. Developing producer organisations takes time and can require significant accompaniment. For example, the shea butter organisation is part of the Fairtrade International (FLO) system, and is provided with producer support and receives a Fairtrade Premium on certified sales.

Adaptation to climate change is likely to require systemic as well as individual changes in behaviour and practices, and change at different scales – this is the importance of involving AIS stakeholders – to try and help shift the whole agricultural innovation system towards a better understanding of climate change challenges and opportunities. **Of course this is a long-term process and one study tour can only make a small contribution – but the approach is clearly valued by farmers and the other AIS stakeholders and could be adapted for use in other**

**development and climate change adaptation programmes.** Learning between farmers and documentation using video by farmers themselves are both approaches that are becoming more widely used in development – but in combination they are less well known. **The climate analogue tool was an important part of the process in Ghana – and easier to apply than in the highly dissected landscape of the Tanzania equivalent CCAFS site, where climatic conditions vary over small areas due to changes in altitude. However, the outputs of the climate analogue tool need careful ground-truthing by those with local knowledge and experience, and it is important that they are used as learning tools rather than predictive ones.**

#### 4. Assessing adaptation and mitigation learning processes and outcomes in different socio-cultural contexts

CCAFS aims to identify ways to catalyze action from knowledge about long-term adaptation, climate risk management and low emissions agriculture so that it can achieve this global vision as quickly as possible. One of the objectives of the Farms of the Future project was to identify opportunities and obstacles to learning in different socio-cultural contexts. The action research and experiential learning approach adopted by NRI appears from the feedback of participants to have been valuable. If social learning is understood as involving ‘interactive communication among diverse participants in a genuinely participatory setting’ (Muro & Jeffery, 2008), then this has been achieved. For Reed et al (2010) social learning should not be confused with pre-requisite conditions and methods, but should achieve a *change* in understanding of the *individuals* involved, whether fairly superficial in terms of obtaining new information or deeper (e.g. changes in worldviews and attitudes) and the learning should also become embedded within wider social units or communities of practice and occur through direct interaction (e.g. dialogue) or indirectly (e.g. through mass media, ICTs).

In our project we facilitated a method to support social learning and sought to facilitate a structured evaluation process by participants in order to understand if social learning had occurred. Participants indicated changes in understanding at least in superficial terms. For example, Lushoto farmers expressed intentions to establish a SACCOS in their own community and to test the Matengo pit technique. How far the villagers have acted and what barriers they have encountered requires further research and ideally a continuation of the reflective learning with the CCAFS site stakeholders.

Whether the learning was deeper and how far it was embedded socially we cannot assess without an ex-post evaluation. However, the approach is clearly promising as a means for creating this kind of individual and networked societal change.

In terms of facilitating the process it was clear that there are gender based challenges in the societies within which the approach was piloted. Socio-cultural norms restrict women’s mobility and participation in study tours – this was particularly the case in Ghana. However, for the women who were able to participate, their feedback was positive and by giving equal voice to the women participants in study tour reflections and feedback to their community this can send a powerful message. To understand the extent of the change in individual understanding requires more ex-post evaluation, but the initial feedback was highly positive. For assessing whether the social learning has been embedded and is leading to further change at the community level and to identify the specific socio-cultural barriers and opportunities also requires research which can explore and track on-going processes of decision-making and negotiation within and between households. In the expressed intentions of starting a SACCOS scheme or testing Matengo pits women participants were as enthusiastic as the male participants.

*“We saw that there is seed of avocado of short duration, potatoes of short duration, maize of short duration. Now for this system we shall take this system ..we will go back where we come from in Lushoto and mobilize each other as possible so that we also take this system for these seeds of short duration instead of going with that seed of long durations, because those do not remove poverty”  
(Tanzania)*

Learning from peers is important. Structured facilitation of peer learning amongst smallholder farmers has been recognized in international development for some time, for example farmer-to-farmer exchange processes in Central America in the 1980s and 1990s . The CCAFS sites offer rich opportunities for facilitating learning processes between peers, but also importantly supporting a shift in mindsets amongst agricultural innovation system stakeholders to listen to farmers and become more facilitative and responsive, and to have improved connections with them (Lamboll et al, 2011). Two types of learning are needed at all levels – from farmers to CCAFS and policy-makers – both instrumental learning (task and performance oriented) and communicative learning (understanding what others mean when they communicate with us and understanding their purposes, values and intentions) (Diduck et al, 2012). Too often climate mitigation and adaptation research in agriculture has focused on the former, without acknowledging the need for both.

*“We saw our fellows’ success in the SACCOS [savings & credit scheme] from the cooperation they have...So cooperation is an essential thing in every activity. In the market too we found the same cooperation which gave them success... There villagers have become entrepreneurial as a result of their SACCOS. So we have come to realise that if there is leadership and if there is cooperation they bring success in the community”  
(Study tour Lushoto farmer, Tanzania)*



Farmers recording their reflections in the field

## 5. Analysis of the approach

There are significant challenges in responding to climate change for disadvantaged farmers and rural communities, because of their lack of assets and power, because of the uncertainties inherent within climate science and the lack of downscaled climate projections. Having piloted the Farms of the Future approach in two countries our analysis of the findings are as follows:

- The climate analogue tool is a useful tool, but only when its limitations are clearly recognized and understood by those explaining it and those using it. It should be seen as a **tool for learning**, rather than as a tool for prediction. It can support communicative and instrumental learning by farmers. Further piloting and evaluative work is needed to see if the approach can lead to deeper change in individuals' understanding and learning processes and lessons which are embedded in societal/agricultural networks.
- The climate analogue tool can be used to **underpin exploration of future scenarios** by sub-regional or landscape planners, farmers and other stakeholders (e.g. private sector actors) and with good facilitation can support structured learning for adaptive action.
- Rather than considering farmer exchanges, involving one group from site A visiting just other group in location B, it is more appropriate to undertake facilitation of a **learning journey** for farmers and other agricultural stakeholders. This is because the uncertainties involved in climate modelling and the influence of other non-climatic factors means that learning cannot be about simple technology transfer leading to adaptation, but has to be about raising awareness of uncertainty, increasing willingness to adapt at different scales and building resilience to shocks and stresses.
- To strengthen adaptive capacity requires **institutional, structural and policy changes, not only technological innovation. A lack of access to land, seed funds, capital and information will present obstacles to farmers in adapting to climate change.** Therefore learning journeys should support exploration of institutional adaptations and opportunities, and engage with stakeholders beyond the individual farmer level, as policy-influencing requires engagement with more powerful actors.
- The learning journey study tours to analogue sites can enable farmers and agricultural stakeholders to **better envision how their site-specific agricultural future might look** and facilitates exchange of knowledge through which strategies and farming information can be shared.
- Understanding climate modelling can be challenging for non-climate scientists and there are **risks if the outputs of the climate analogue tool are not adequately ground-truthed** and used to spark exploration of future scenarios rather than a means of seeing into the future.
- The **Farms of the Future approach is likely to be most effective when embedded within an overall participatory adaptation process**, so that support can be given to the participants, their communities and agricultural stakeholders, to act on insights and innovate.
- **Significant opportunities exist for more farmer-to-farmer and other agricultural stakeholder-to-stakeholder** shared learning on adaptation. Farmers need space to explore future horizons and potential challenges and opportunities, and can effectively learn from their peers. This learning is not necessarily about technology transfer, but about institutional change and developing localized solutions.
- It is **critically important to engage actors from across the agricultural innovation system**, because of the uncertainties posed by climate change, the need for more flexibility in responses (e.g. from agricultural advisors) and the potential scale of the challenges ahead. Engaging with private sector actors in such learning processes is important.
- Further research is needed at CCAFS sites to **understand the specific social and cultural norms which present barriers to equitable and effective mitigation and adaptation**. In a rapid action research process it is not

possible to unpack the nuances of gender and social relations – instead learning should be undertaken as part of the participatory action sites at the benchmark sites. In terms of the learning process facilitated by Farms of the Future while fewer women than men were able to participate, particularly in Ghana, the approach was valuable to both female and male participants according to their own evaluations and the process itself can positively reinforce women's voice in reflections and shared experiences.

- To more fully understand the outcomes of the pilot requires a **follow up ex-post evaluation** to explore whether the study tour sparked new thinking and practical action, assess its contribution to an overall participatory action research process, including identification of the social and cultural barriers to adaptation.

## 6. Conclusions and Recommendations

The Farms of the Future approach, combining climate modelling/ analogue tool, farmer study tours, and participatory video, can support adaptive capacity strengthening when embedded in a participatory research process. A short-term initiative is unlikely to shift entrenched norms and structural barriers to adaptation, but it can help to introduce ideas about longer term climate change, and build greater consciousness of climate change challenges, opportunities and awareness of the need to act. It can help to articulate demand for action from farmers and other stakeholders in the agricultural innovation system and support reflection amongst participants on what potential future scenarios might look like. Participants identified a number of technological and institutional adaptations which they valued from the study tour and have shared with their own communities. Thus, the Farms of the Future approach can complement on-going participatory action research in agricultural adaptation in poorer and resource constrained communities. There are multiple ways in which this type of initiative could be applied across international development, to support critical reflection, horizon scanning and sharing of information amongst farmers and wider stakeholders for positive action.

The climate analogue tool is a less useful as a *predictive tool*, but has great utility as a *learning tool*, when embedded in a participatory process. As a prediction tool it raises too many risks of misleading farmers. The psychology and ethics of the process are important – taking farmers to visit places where the climate is much more challenging could be overwhelming and have a negative impact on willingness to act. Future climate modelling should not be thought of as providing a picture of a future climate, and especially what the farms and adaptations will be – human creativity and socio-ecological dynamics of systems mean prediction is not possible and would be misleading. Thus it should be emphasized that the climate analogue tool is based on projections (not predictions) and should be used more as a means of education in terms of climate science and of sparking learning processes that support positive development and climate related action.

- More support should be provided for good quality facilitation of participatory action research to explore future scenarios amongst farmers and wider agricultural stakeholders, using the climate analogue tool, but emphasizing the ground-truthing and combining this with training on technical skills and equipment for video making.

Ultimately, building adaptive capacity will require far-reaching institutional, structural and policy change, but such a process can *contribute* to increasing awareness which is currently very limited at the local and district levels of the challenges of climate change and of thinking through *possible* future scenarios. It is critically important to engage actors across the agricultural innovation system as adaptive capacity strengthening cannot be achieved by farmers alone. Study tours can be valuable to build willingness to act amongst farmers and support exploration of potential responses to climate change, both institutional and technical.

- More farmer to farmer study tours should be facilitated as an effective means of enabling adaptation.
- Significant opportunities also exist for more stakeholder to stakeholder learning on adaptation using this approach, such as study tours.

More work is needed to find appropriate and ethical ways to communicate with farmers and other stakeholders about the *global* causes of climate change, the difference between climate variability and longer term climate change, and potential solutions.

- Specific research is needed to develop effective strategies for communicating the global causes of climate change to farmers and other stakeholders. Innovations in the use of ICTs in this regard are highly recommended, for example, using simple, local language, explanatory videos.

There is no evaluation as yet of such approaches in comparison with other approaches with similar objectives.

- More investment is needed in evaluation of the farms of the future approach in terms of its ability to contribute to individual and systemic change, vis-à-vis *equivalent investment* in other complementary or alternative approaches.

Understanding climate modelling can be challenging for non-climate scientists and more resources are needed to enable learning (e.g. at district level). While a great deal of very useful interaction took place between the CCAFS modellers and the NRI team in the identification of potential analogue sites, ways need to be found to scale up this process.

- More resources are needed to strengthen capacity of different actors (e.g. district officials) to use the CCAFS analogue tool.

The idea of a learning *journey* is proposed to enable farmers and other stakeholders to explore a variety of challenges and learning opportunities to maximize the usefulness of the tour.

- Draw on a wide range of other information in identifying study tour locations, discussing with stakeholders a choice of locations which offer similarities in terms of challenges, or known learning opportunities, as well as analogue sites from which a selection can be made.

Tackling climate change cannot be achieved by farmers alone. For systemic change all actors in the agriculture innovation system or landscape need to be engaged and motivated to act.

- Significant opportunities exist for more stakeholder to stakeholder learning on adaptation using this approach, such as study tours.

Gender and social inequalities which mean marginal groups are both vulnerable to climate change and less likely to be able to participate in the kinds of learning processes outlined here. Yet real benefits could be achieved from challenging constrictive gender and cultural norms to better lives for women and men. Video can be an important way of giving women a voice, for example, in communities where they may not be listened to usually. It is important to attract young people to stay in or to engage in agricultural livelihoods and study tours and participatory video could be adapted to support this.

- Take steps to ensure that women, young people and marginal groups are given as much encouragement as possible to participate in the study tour and are given equal voice as men in discussions, filming and editing.
- Support further development of approaches to enable learning and adaptive capacity strengthening amongst women and marginalized groups. Gender-based study tours represent a major opportunity to show women and men that gender roles are not fixed and that changes can bring positive benefits for the entire family.

Climate modelling/projections have inherent uncertainties, especially in upland areas like Lushoto where major changes in altitude over short distances complicate the situation.

- Support participatory 3D modelling and scenario building, analogue tool, study tours and participatory video approaches within a landscape (e.g. a CCAFS site) to support local change.

Participatory video is an important tool for supporting farmers to document their own learning and for sharing this with their own communities – which increases opportunities for strengthening adaptive capacity. The use of ICT tools, such as video, can significantly improve the cost effectiveness of this approach and support scaling up processes. However, it is important to distinguish between video used for social documentary or public relations purposes, and video as used here where farmers are trained to use the cameras themselves and are involved in the editing process.

- Encourage the uptake of participatory video in climate change adaptation programming, but ensure clarity in terms of the purposes of the video footage taken and the process undertaken. In particular ensure there is clarity and equity in who holds the rights to video materials.

To assess the outcomes of this relatively small project in two countries would require an ex-post evaluation. The participants were highly positive about what they had learned and in both cases planned to follow up with new innovations. But to follow through the (probably unexpected) outcomes requires some follow up reflection with participants, their communities and wider stakeholders. Much of the ultimate impact depends upon the quality of the participatory action process within which Farms of the Future study tours are undertaken.



- Support evaluation of Farms of the Future pilots and evaluation of similar more recent study tours (e.g. those involving policy-makers).

### Practical lessons on organizing climate-related study tours

The study tour process itself was warmly appraised by participants due to the sense of camaraderie on the 'climate change tour bus' – sharing a journey together can produce unexpected outcomes and a bonding between participants. However, the logistics of organizing a study tour can be demanding and there are health and safety issues to be considered. One of the climate analogue sites in Tanzania was at the opposite side of the (very large) country involving a long bus journey. On such a trip it is not always possible to stick precisely to the study tour itinerary. Where preparatory communications had been made with the hosts the visits tended to be more successful.

- Proper advance planning is necessary to ensure smooth running of the trip, but flexibility is necessary as changes to the itinerary are likely to occur. Good communication amongst facilitators and participants is also essential in a large group of people. Clear briefing should be provided to host about the purpose of the visit and the type of interaction between farmers and stakeholders being sought. Practical demonstrations tend to be the most effective, rather than formal presentations and structured debate.

*For further information:* See <http://projects.nri.org/farmsofthefuture>; or contact: Valerie Nelson: [v.j.nelson@gre.ac.uk](mailto:v.j.nelson@gre.ac.uk); Richard Lamboll: [r.i.lamboll@gre.ac.uk](mailto:r.i.lamboll@gre.ac.uk); Nick Nathaniels: [nicquist@gmail.com](mailto:nicquist@gmail.com)

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