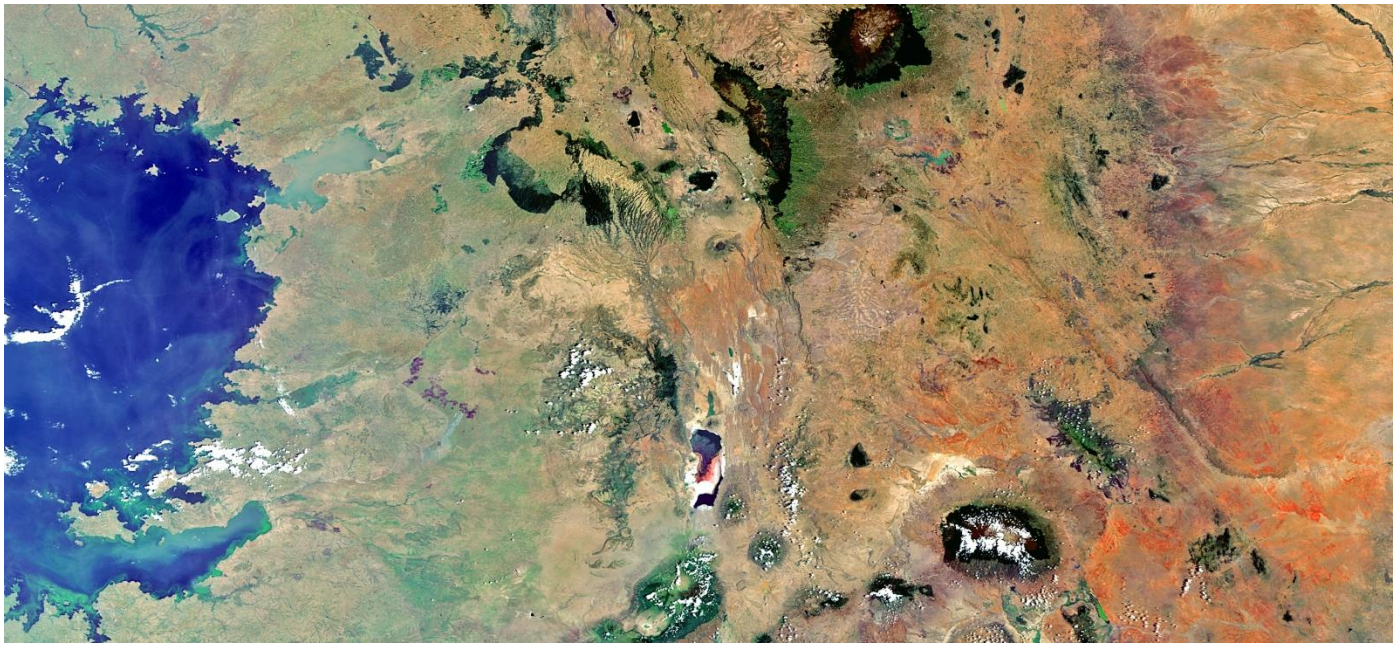
The Cambridge Forum for Sustainability and the Environment

Meeting 8: 12th May in Downing College



Aims

This month, and we will be looking 'through an East African lens' and picking up on some of the global trends and research themes we have identified since October. This is the first time that we have focused a discussion on a specific region and the three witnesses will help us to explore questions related to regional food security, sustainable intensification and resilience to climate change.

We're jointly hosting this meeting with the Global Food Security Initiative and the Cambridge-Africa Programme.

Agenda

All the witnesses will give a 10 minute introduction and their perspective on the two core questions followed a general discussion:

5:00pm	Welcome by the Chair and an introduction to the topic
	Each witness gives a short introduction and thoughts about the questions (10 mins)
	Questions and beginning the open discussion
6:00pm	Coffee break
	Continue the discussion in three groups and then come together for final thoughts
7:15pm	Reception and dinner, which will include a working session

Witnesses

This month, the three witnesses are:

Liz Watson	Senior Lecturer and Pybus Fellow of Newnham College, Department of Geography, University of Cambridge
Tinashe Chiurugwi	Research Associate in the Business Strategy team at the National Institute for Agricultural Botany (NIAB)
Alison Mollon	Senior Programme Manager, West & Central Africa, Acting Regional Manager, Africa at Fauna and Flora International (FFI)

Questions

The witnesses have all been asked two core questions:

1) What do you perceive as being the main gaps in our knowledge?
2) What would you include in the 'next generation' of research questions?

Each of these questions will be posed to everyone and their answers will then be used as a springboard for further discussion. The main points raised will then sent to everyone to use as a starting point for the next meeting.

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Witness profiles

Tinashe Chiurugwi

Research Associate
National Institute of Agricultural Botany (NIAB), Cambridge

Tinashe Chiurugwi's specialities are crop improvement and technology transfer, having worked on a range of horticultural and arable crops in Zimbabwe and the UK at Pioneer Hi-Bred, Seed Co Ltd, University of Reading, Rothamsted Research and CGIAR (the Consultative Group for International Agricultural Research) Consortium.

As a research associate within the NIAB International Initiative, Chiurugwi develops proposals and fundraising strategies and delivers projects to apply NIAB skills and expertise to agricultural issues in developing countries, including year-long scoping study to determine the feasibility of applying the NIAB Innovation Farm concept (a knowledge exchange/technology transfer hub) in Ghana, Uganda, and Kenya. He is now spearheading fundraising efforts to launch NIAB Innovation Farm in Ghana and Uganda.

In Tanzania, he has also been collaborating with Naliendele Agricultural Research Institute, to identify the facilities, practices and mechanisms that would improve the translation of agricultural research into farming practice in Nachingwea District, Southern Tanzania. In addition, he been assisting in the management and leadership of a research project that has built a UK-Kenya partnership to support the uptake of new crop varieties by Kenyan smallholder farmers. As part of this, he coordinates participation by NIAB staff to help researchers at the Kenya Agricultural and Livestock Research Organisation to develop knowledge exchange models suitable for smallholder farmers, and in the production and distribution of communication materials.

Alison Mollon

Senior Programme Manager, West & Central Africa, Acting Regional Manager, Africa
Fauna and Flora International (FFI)

Alison joined FFI in April 2014 after returning from the Democratic Republic of Congo where she was the Programme Manager for the Frankfurt Zoological Society. From early 2011 Alison was based in the headquarters of the Virunga National Park and was responsible for multi-donor project implementation including the GEF National Parks Network Rehabilitation Project. Focussing on protected area management, Alison also oversaw projects that supported the Maiko and Upemba National Parks and lead on programme assessment, development of the national strategy and the resulting project design. Alison also became experienced in developing and leading operations in conflict zones. She specialises in species population estimates and has contributed to analysis of sampling methodology of great apes in Central Africa and has advised the government of St Lucia on best practice management and monitoring of the St Lucia Parrot.

Alison is currently leading the FFI Africa Regional Team to address threats to species and habitat conservation focussing on different protected area management systems, sustainable use of forest and forest related resources and engagement with business. Alison previously worked as a Project Manager for the GSMA, managing mobile money projects.

Liz Watson

Senior Lecturer and Pybus Fellow of Newnham College,
Department of Geography, University of Cambridge

Liz Watson's research focuses on the relations between livelihoods, institutions, environment and development in the drylands of the Horn of Africa. In Ethiopia, work in Konso examined the production and sustainability of its intensive agricultural terraced landscape, and focused on the nature and significance of indigenous social institutions for governing land and labour.

More recently, research with the pastoralist Boran and Gabra of northern Kenya and southern Ethiopia has explored the dynamic and adaptive nature of mobile livelihoods. In the context of multiple stresses, social, cultural and political developments - as well as 'Development' projects - have often undermined indigenous institutions and have exacerbated exposure to risk and vulnerability. New research, funded by the Royal Geographical Society with IBG Thesiger-Oman International Fellowship, examines one of the local responses to the current challenges, namely the increased preference for camels. Camels are seen by pastoralists as better adapted to a changing climate, as well as potentially more profitable given the changing nature of regional trade and increased urban demands for milk and meat.

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Duration: **1:59:40**

Expert Witnesses

Tinashe Chiurugwi (TC)

Alison Mollon (AM)

Liz Watson (LW)

Forum Members

Alison Smith (AS)
Chris Gilligan (CG)
Gavin Siriwardena (GS)
Gemma Cranston (GC)
Hannah Becker (HB)
Henry Ssebuliba Busulwa (HSB)
Howard Griffiths (HG)
Ian Hodge (IH)
Jake Reynolds (JR)
James Wood (JW)
Jonathan Green (JG)
Martin Rees (MR)
Nigel Leader-Williams (NL-W)
Paul Linden (PL)
Pauline Essah (PE)
Phil Franks (PF)
Rodah Owako Okeyo (ROO)
Rosamunde Almond (RA)
Shailaja Fennell (SF)
Stephen Asuma (SA)
Susan Owens (SO)
Will Simonson (WS)
Sophia Mahroo (SM)

Transcript

MR:	Can we start? I'm Martin Rees, I'm the Chairman and I'm an astronomer so I'm not really an expert in any of the matters here but it's great to be part of this group and I'd like to specially welcome the three witnesses who are going to speak today: Liz, Tinashe and Alison who will be speaking for about 10 minutes each to stimulate discussion for the rest of the session.
	There are in fact more new people here today than at typical meetings. Lots of experts on East Africa which is our theme today and I think it might be good to go around the table with everyone just very briefly introducing themselves, just one or two sentences.
PL:	So I'm Paul Linden, I'm the Director of the forum and I'm in the Applied Mathematics and Theoretical Physics Department and I'm interested in environmental modelling.
SA:	I'm Stephen Asuma, I am an MPhil in Conservation Leadership, but I work with the International Gorilla Conservation Programme back in Africa, I come from Uganda. I hope I'm sitting in the right place [overspeaking 0:01:08].
GS:	Gavin Siriwardena, I'm from the British Trust for Ornithology, I work mostly on agricultural bird issues. Not much direct interest or research interest I should say in Eastern Africa but as an organisation we are increasingly working on migratory species and African species as well.
CG:	Chris Gilligan, I'm an epidemiologist and mathematical modeller. I've got some projects with the Gates Foundation on cassava and wheat in East Africa and West Africa.
SO:	I'm Susan Owens from the Department of Geography, I work on science and politics mainly and this area is very new to me.
IH:	In the business of denying, I'm Ian Hodge from the Department of Land Economy and I work on institutional issues, land, property, environmental issues, policy issues,

	agricultural policy and environmental management and those sorts of areas, mostly in developed countries. That's my denial.
HB:	I'm Hannah Becker, I'm from Fauna and Flora International, I recently started working on the East Africa programme there so this is a great opportunity for me to get to grips with some of the issues facing the region. I've had a bit of experience studying food security issues from a theoretical perspective so this will be helpful to build on that.
NL-W:	Nigel Leader-Williams. I concur that I have spent 10 years in Africa studying large mammals, both in Tanzania and Zambia. My interests there have mainly been in large mammals that are being illegally poached and taken and I find that research that I did in the 1980s is of importance now because the same thing is happening all over again.
JG:	I'm Jonathan Green, I'm a postdoc in Geography but I also work very closely with the Natural Capital Leaders Platform in the Cambridge Institute for Sustainability Leadership.
LW:	I'm Liz Watson, I'm from the Department of Geography and I'm going to be telling you much more about myself, so I'll keep my powder dry.
AM:	I'm Alison Mollon, I'm also from Fauna and Flora International. I'm currently the acting manager for the Africa programme. My background is central and West Africa, I spent several years working in eastern DRC.
TC:	My name is Tinashe Chiurugwi, I work for NIAB and I'm originally from Zimbabwe but I have projects now in Tanzania and Kenya and also in Uganda, so don't shoot me down, at least Roz told me if you shoot me I can shoot back.
PE:	Hello everyone, I'm Pauline Essah and I'm originally from Ghana but I managed the Cambridge Africa Programme here in Western Cambridge and I've co-organised, partnered with Roz and Will in organising this forum.
JW:	So I'm James Wood, I'm a veterinary infectious disease epidemiologist at Cambridge Vet School and have been involved in the Cambridge Africa Programme since its inception and also have recently taken over chairing the Strategic Research Initiative in the Cambridge Infectious Disease SRI. My work in Africa is focused mostly on emerging infectious diseases in West Africa but through the Cambridge Africa Programme have quite an extensive programme engagement with East African universities and particularly Uganda.
JR:	I'm Jake Reynolds also at the Institute for Sustainability Leadership. I'm responsible for our business and our policy engagement. Uganda seems to be quite a theme here but I worked in Uganda for three years in the early 90s in Makerere University and also in forest conservation and CISL also has an office in Cape Town with a broadening Africa vision and are not restricted to South Africa but we are interested in partnerships elsewhere in Sub Saharan Africa.
GC:	Hi, I'm Gemma Cranston, I'm also from CISL and have very little African experience apart from having enjoyed holidays over there, so there's my disclaimer. I'm particularly interested in representing one of the companies that we had, Asda, who have got an interest building on the cotton discussion we had here, particularly in Zambia and Tanzania.
PF:	I'm Phil Franks, I work with the International Institute for Environment and Development but only for the last year, prior to that I was working with NGO Care International heading up their international work on conservation, development and in forestry and deforestation, the technical term being REDD, and also agriculture. I spent about 20 years in East Africa, mostly in Uganda and Kenya.
WS:	Hello, my name is Will Simonson, I'm from the Department of Plant Sciences and I'm the coordinator for the Global Food Security Initiative here at the University, so I've

	enjoyed working with Pauline and Roz planning this meeting and I've been involved in some of the previous meetings of this forum meeting.
SM:	I'm Sophia Mahroo, I'm a recently appointed coordinator for the CAPREx program which is part of the Cambridge Africa Programme mentioned by Pauline Essah just now. We receive visiting African researchers on fellowships to collaborate with the Cambridge researchers and many of our upcoming ones will be working in plant sciences.
HG:	Hello, I'm Howard Griffiths, I help Chris to coordinate the Global Food Security programme, the initiative and I'm involved with the Africa programme this year and for my sins I did work on tea in Malawi for three months, it was many years ago, from a physiology…the physiology of tea.
HSB:	My name is Henry Ssebuliba, I'm from Uganda. I have worked for conservation for 15 years managing Ugandan National Parks and now for the last seven years I've been a lecturer at Makerere University for biology and biology education teacher programme. So I'm here on the CAPREx collaborative programme to deal with environment education in schools in Uganda.
ROO:	I'm Rodah Owako Okeyo and I'm from Kenya, at least someone from Kenya, and I'm a student on the MPhil in conservation leadership course at the Department of Geography and I'm working on climate change as well as working with businesses and seeing how we can collaborate with them.
RA:	Hi, my name is Roz, my background is in conservation biology, particularly the sustainable use of wild animals and plants and sustainable use indicators and I've e-mailed you all an awful lot. So thank you very much for coming, I'm looking forward to this discussion.
MR:	Roz is the person who does most of the work and she will be taking notes on what's being said. Is that right?
RA:	Yep. And we record it as well but we don't give it to anyone.
MR:	No, that's right, we've got what's called Chatham House rules where what you say will not be attributed to you so you can be entirely frank.
	Shall we start and we've got three speakers and I think Liz was going to speak first. Is that right?
LW:	Thank you very much for inviting me to be one of your witnesses. I'm going to read this or use these notes which I don't usually do but it's because the topic is really huge and I want to try and stick to time and stay on top.
	I come to these issues as a human geographer and I've spent most of my research live in exploring indigenous food production systems in Kenya and Ethiopia, sadly not Uganda. I've worked on intensive smallholder agricultural systems and more recently I've been looking at pastoral and agro-pastoral systems and all our work has tended to be in the drier lowland regions of Kenya and Ethiopia. In Kenya these areas make up 80% of the total land area and in Ethiopia make up more than 60% of the total land area, these are areas with less than 600 mm of rain per year.
	So these areas are large and highly significant but they've often been viewed as not very important to where the real business of food production takes place. So despite their size these areas have been politically and economically marginalised, have been viewed as a drain on the state rather than as having anything positive to contribute. This is not surprising as they've historically been associated with food insecurity and only as recently as 2011 30 million people in this area were affected by food shortages following drought and 50,000 to 100,000 people are estimated to have died from hunger.

	These people who depend on rain fed livelihoods have also been seen as highly vulnerable to the negative impacts of climate change. High population growth, high levels of poverty, a history of livestock raiding in the region and concerns have been raised that these areas are likely to experience what Christian Parenti has recently called a catastrophic convergence of violence, poverty and climate change. These very real concerns have fed into calls for new policies that made the design and implementation of new strategies urgent and these new policy trends include things such as calls for a new green revolution, employing drought resistant and pest resistant crops, investment in irrigation to make people more resilient and less dependent on rain fed agriculture. In some quarters there are also calls for the scaling up of production and the expansion of commercial agriculture with attractive tax breaks in the region offered to new investors to expand their activities. Sometimes we had different combinations of these kinds of approaches.
	We are left to talk about what we know and what the gaps in research are. So in relation to this firstly we know that in this region what happens on paper in terms of many of these initiatives and what is discussed in international offices is frequently very different from what takes place on the ground. Therefore careful open-minded research is needed to explore what is happening and to examine the social and environmental impacts of these developments. Some findings to date suggest that irrigation and other large-scale activities for example are more likely to focus on non-food or non-essential food production such as sugar production or biofuels for example and there are cases in Ethiopia where pastoralists have been displaced from areas of grazing land to make room for the cultivation of fodder for racing camels in Dubai. This case for example is one where you have new irrigation development across the dryland regions and fodder being exported twice a week to Dubai by plane to feed racing camels. It's just one illustration of the way in which perhaps these initiatives which are often justified in the name of climate and food security, we need to have these new technologies to transform these areas into more productive areas, are often limited sometimes in perverse and bizarre ways in terms of their contribution to food security and sometimes may undermine it all together.
	Now as I said we need more research into these processes in order to explore what is really happening on the ground and this is not easy for reasons that we might want to talk about later.
	So that's kind of my first point about issues that need further discussion.
	My second point relates to one of my main concerns in my own research which is that in the rush to provide new solutions to the major current challenges we are facing the value of indigenous production systems and the possibilities for working in partnership with local farmers tends to be overlooked. Indigenous agricultural practices are frequently portrayed as unable to cope with the scale of contemporary challenges prompting policymakers to engage and call for system redesign in ways that frequently have little room for existing systems or their practitioners. It's worth noting that in this region, in the drylands in particular, system redesign in practice has usually fallen short of expectation and has left as one commentator concluded 'The target population and its ecosystem worse off.'
	So I'm arguing that research and policy are in danger of overlooking the value of indigenous food production systems as they have in the past in the 1980s as someone said. What is that value that we offer to the current challenges? Here I could go on all day but I think it's worth pointing out just a few things to highlight their value. It's been shown indigenous agriculture often makes efficient use of scarce natural resources and is often highly productive and the contribution to food security and economy has systematically been underestimated. The technologies and practices of indigenous agriculture are embedded in valuable social institutions that manage access to resources which is of particular importance to food production and the management of

	these environments. Indigenous agriculture is often assumed to be subsistence oriented but it's actually integrated into modern and dynamic economies and it's risk averse which may be more important given the scale of climate variability. Pastoralism for example is often assumed to be a livelihood that is likely to be the worst hit by climate change, but we know that pastoralism developed as a response to extreme climate variability thousands of years ago, probably 7,000 years ago in response to a drying event and that these environments are able to cope with climate variability which may be higher than much of which is predicted in current scenarios. So it's a valuable resource and its biodiversity as well can add to its ability to be resilient in the face of climate change.
	So all of these points which are often overlooked could be the subject of further research.
	Finally research could usefully examine further how such systems are changing in response to contemporary challenges and how they might be supported better. Indigenous agriculture, and by this I mean farmer managed systems which have been developed in situ by people who have lived in those environments for a long time, has often been portrayed as traditional and conservative but these farmers are good at integrating new practice into their methods. To give but one example I've been studying how pastoralists in the Kenyan Ethiopian borderlands who have historically favoured cattle pastoralism and who have had cattle at the centre of their cultural, social, economic worlds and the centre of their environmental management practices and so on have recently taken a relatively radical step of replacing their cattle with camels who were formerly not favoured animals, which they see as more adapted to this drying environment. The value of camels has also gone up in comparison to cattle and camel herders are now part of a dynamic and expanding international trade network exporting camels to the Middle East. This network is something which is an organic network, it's not something that's been created by outsiders but it's something which is actually just going on as it is and is actually supported quite a lot by the government in Ethiopia, less so in Kenya.
	There's also high demand for camel milk in the growing urban centres of the region. So we can see that indigenous farmers are adapting to new environmental and economic conditions but their success does not mean that there are no problems to address. Not everybody can engage in what has become a new camel economy and this raises questions about inequality within communities as well as between communities and let's say outside investors. A further problem has been that there is very little support for the health needs of camels or knowledge of camel disease among these new herders. Camel mortality is high, camel medicines and veterinary support is almost non-existent, farmers treat their camels with medicines designed for goats or other animals, so there is a great opportunity for researchers to work with pastoralists and to use new technologies such as smart phones to help these innovative farmers monitor these patterns and treat their animals to support the development of a new and productive camel economy in these drylands. I suppose what I'm trying to say is there's a lot going on which could be supported in very useful ways on the ground.
	I could say more about agriculture and new seeds and supporting farmers along lines but I should think Tinashe is going to talk about that.
	So in summary my main points are that in the East African region indigenous agriculture represents a valuable resource for food security, particularly in the face of current challenges and it deserves more attention from researchers and policymakers. There is a danger that under the current climate and population scenarios indigenous agriculture is brushed aside anew and seen as not up to the job literally of providing food, but I'm suggesting and research suggests that this is a mistake. In that context new policies are promoted which do not involve local farmers, such as the large-scale irrigation schemes, leaving the farmers more vulnerable and also having questionable

	environmental impacts. So researchers can be part of exploring but only together with farmers how indigenous agriculture in these drylands might be strengthened and supported. Those are some of the issues which I think are important from our research.
MR:	Thank you very much. I think we're best to hear the other two panellists before we have discussion, so let's go on to Tinashe to speak next.
TC:	I will talk a little bit about NIAB just to give you an idea of what we do and why we are involved in agricultural development. So NIAB was set up in 1924 following the First World War because there was a problem with seed supply in the UK. People were bringing in seed from maybe the US or from Australia and there wasn't anyone to protect the farmers. Once the seed has been sown sometimes it didn't germinate or it wasn't the right variety, so it was set up to ensure the farmers a good quality seed and it was the right variety that they thought they were buying. Then as time went on we then got involved in also developing varieties, but because we are sort of a quasi…we used to be a public institution, now we are sort of an NGO which is still funded by the government because we do work for the government, we still do seed certification work and plant variety trials for the government. We also do now genetics and plant breeding, developing and improving plant varieties, but then we do that in collaboration with the private sector because we're not in the business of selling seed.
	We also do research because of course it's good to know what seed you have, what variety you have and you also need to know how to grow it, so we also do research on agronomy and how to use those varieties. Then we have a very close relationship with farmers, we have a membership service where farmers that subscribe get information about plant varieties, about agronomy, about what's happening in terms of policy, agricultural policy, either from the EU or from Defra. We also have what we call NIAB Innovation Fund, it's another way again of interfacing with farmers and the general public really and the idea of the Innovation Fund is to say, well, there are researchers working on plant genetics and trying to improve varieties, but if you don't talk to the target markets before they actually finalise their project making for the situation we had, for example, with GM where the researchers are saying something, the regulators are saying something, the public is confused and then the retailers are also saying whatever they're saying, and the farmers really want to use GM but there is that problem with conversation. So the idea of the Innovation Fund is we talk about these innovations while they are being developed in the hope that if people are interested in them then we don't waste time developing something that will not be used in the end.
	So coming then to international and cultural development. What I'm doing within NIAB is to take any skills within the Innovation Fund, within the crops and agronomy research study, within the genetics and breeding and also within seed certification and plant variety trials, to see what can be applied within a developing world context to improve the awareness and access to improved varieties, but also to improve the way certain technologies and researchers communicate with farmers and the general public. So what I've been doing in Uganda, Kenya and Tanzania was to see if we can modify the Innovation Fund platform which is a couple of demonstration plots, some demonstrations in the glasshouse and also a meeting room, if we can modify that idea and some of the technology transfer methods that we have within NIAB to suit the conditions in Kenya, Uganda and in Tanzania to improve again the awareness and production rates of improved varieties, but also improved agricultural practices. We also have been looking at…because there have been a lot of projects and as someone has already said some projects come and they go and then go back and do the same thing again. So there have been projects for example in Uganda where they tried to improve the seed certification system, US Agency has tried it, Danida has tried it and still there is a problem. We've still got this one man in an office and he's supposed to certify the seed for the whole country. So what we're trying to do then is to say what are other ways of doing it? Obviously the way we do it here we will have a system of

	inspectors who are regulated by the government and coordinated by NIAB, it doesn't obviously work, this hasn't worked for a long time and people have tried in different ways to make it work. So what are the new ways of making it work? Also because we know from a safe seed on the fund from the previous crops and planted, what are the ways then of making sure that when they do that they actually know that the seasonal variety that they had the year before and also that it's good quality so that at least they know what disease infestation they have, what germination rate they will have so they know what seed rate to use, how many seeds to put and it helps then to achieve a certain population.
	So it's not to say let's move everyone into the more formal seed system but to say how can we work with the existing systems and actually improve them so people know what they are doing and at least know what [inaudible 0:24:50] they are using in their production systems. So we are again working on different models, looking at different ways of how we can improve seed certification and all the work that goes into ensuring that farmers use the right seed when they plant their crops.
	We are also looking at variety assessment in general because usually when a variety is released there are a lot of trials that are done, so if you come up with a new variety you need to show that it's better than what is already in the market and you need to show that it's also uniform, so if someone buys it they know what to expect and they know how to manage it and it has to be different from what is already on the market as well. Mainly because in countries like the UK or the EU you also have rights if you've bred a variety, totally get some money out of people who use it. But in terms of the conditions in many African countries most of the plant breeding is done by public institutions so it may be good for them to get some money back, but still we need to know even if they are not going to get rights for it, that it's going to contribute to make it better for the farmer. So those trials are done and most of the data is available but the problem is farmers do not actually access that data and once a variety has been released we don't know how it compares then to varieties that come out later. So what we're trying to do and this is what we're doing in Kenya in these projects funded by the EPSRC is to say there are varieties that have been released, how do they compare to what is coming up or what has been released before and producing this material so that farmers can at least make an informed choice. Instead of just buying the new thing they can actually stick with their own variety which is as good or better for their conditions compared to what is coming up. In doing that we are working with again the public sector because they want to do the plant breeding but we are also working with seed companies and the agrochemical companies as well because obviously that will be necessary and useful if the farmers are going to make good use of these improved varieties. The other thing that we are doing again is to say okay we have the data, the varieties have been released, we know what they are. One of the [inaudible 0:27:03] that we have is how do we actually communicate with farmers. We have had a lot of projects again funding extension workers and there's a lot of extension work that goes on but still there is a problem in the sense that what the extension worker knows is sometimes out of date or actually a different game to the farmer. So what we are doing is experimenting with some of the ways that we have used here in the UK to communicate with farmers and also adopting new ways of using digital platforms because obviously everyone is interested in how mobile phones can change the way people communicate and do business in various ways. So again we are incorporating those ways of doing things into this project in Kenya. Once we've done the trials, once we've collected the data and analysed it and presented it in an understandable way how can we use modern ways of communicating with farmers or amongst the researchers themselves about this information from the variety trials. Again improving the links, not necessarily between

	the researchers and the farmers, but also along the value chain. So we also want to as we do with Innovation Fund here, we have supermarkets coming in, we have the millers coming in, getting involved in talking about the innovation that the researchers are working in. So we also want to improve that link within the value chain, focusing mainly on the wheat value chain in Kenya on this project. That is something that I think also needs to be explored in other crops as well.
	So I've spoken generally about what we're doing and what I think needs to be looked at in terms of improving awareness and adoption rates of not only improved varieties but also improved agricultural technologies and also ways of improving how that can be used by helping this link within the value chain from the researcher right down to the consumer at the other end. We can talk more about the other projects maybe in discussing but that's generally what we are trying to do.
MR:	Thank you very much. Let's go straight on to Alison now.
AM:	Thank you very much. I will just tell you a little bit about where we're working and what we're doing across Africa. So we do have projects in East Africa which I'm slightly less familiar with being new to that role, but in Kenya we work in the Northern Rangelands Trust, been there historically. Maybe I should say more widely that FFI usually across Africa focuses support around protected areas, be that through a national park system or a community managed area, but a protected area in some form and then with communities who tend to be involved around that protected area. So the Northern Rangelands Trust is a vast area that is now managed by several different community groups, community involvement in there and we've also been working on the coast, incorporating some coastal community management into that project. We also have in Kenya a place called Ol Pejeta which is a reserve that is managed for large species such as like rhino, the rhino have been reintroduced there and also doing a lot of work with communities and actually some new technologies and how new technologies can potentially impact on education and gender issues and how those different aspects can fit into management of community managed reserves. In Uganda we have a project looking at the Lake Victoria basin, again looking at sustainable use of fisheries and ecosystem services there and also we have a quite small reforestation project which is very interesting, looking at land titles and how forest is used in relation to how the titles are…given whether it's government owned or whether people have actual access to the land titles that they feel they own.
	In DRC we work mostly in eastern DRC up in Garamba National Park which supports the actual National Park in terms of law enforcement, much more traditional areas, but also with communities around in terms of IDPs, internationally displaced persons and also to set up microcredit schemes there to try and find sources of livelihoods for people who have been hit by a lot of conflict. Also we're doing a lot of gorilla species, Eastern Lowland Gorilla support work in DRC. Moving further slightly west it might be interesting to talk about some of this, a lot of the work we're doing in Guinea and Liberia, we've got big REDD projects in Liberia so we're certainly working with community forest management groups there to have one of the first viable and validated REDD projects in Africa. Then also working with a lot of the mining sectors in that part of the world and certainly my interest there is looking at secondary impacts of large mining developments, certainly with migration and use of resources, so that's a big focus for me and that side of the world. We also have projects down in Mozambique, again coastal project that is working with a mining and energy project there to work with communities on their ecosystem services and how they are valued and how they can therefore be conserved given the values that the local community has put on them.
	Also we work in the Niassa Reserve which has become really one of the last strongholds for elephants in Mozambique and it's on the border with Tanzania and so elephant poaching is a huge problem there, but also illegal logging. Al just realised I

	missed out South Sudan which almost slides into East Africa and there again working in one of the areas that has remained mostly peaceful which has enabled us to work quite strongly with communities again on traditional protected areas, but by involving communities there we're actually finding out that by involving them and having a say we are able to stop quite a lot of illegal use of extraction there, which is usually actually poaching and deforestation for fuel wood. We're starting to see some very positive results on the camera traps with lots of species coming back.
	So I think that's in a nutshell what we're doing across the Africa project at the moment. When thinking about what gaps we have in our knowledge and what would be useful, certainly very much coming at it from my point of view from an applied point of view and how this can work on the ground obviously what we know is that many of the world's poorest people are dependent on forests and natural resources and their livelihoods and certainly future livelihoods will be threatened by the non-sustainable use of those resources. So usually what we're always trying to do is seek a win-win outcome, both conserve the resources and biodiversity and improve the welfare of local human populations which can often conflict when you're trying to achieve both.
	So certainly for me one issue I would like to discuss with you all today is landscape planning and what especially are the opportunities and challenges and risks around that. How do we have more appropriate crops? What's feasible? What are people prepared to do and what will give them the best returns that also maintains an ecosystem service and I feel like having a landscape approach is the way forward that we need to tackle but how best do we do that? How do we plan farms? Do we plan at a farm level, do we plan at a community level so that we can address local energy and food needs. Obviously there is the land tenure issue and that will be different obviously in every country we work in but how do we address the local energy and food needs whilst having these land tenure issues. Water certainly needs to be thought out at the big scale, definitely at a landscape level scale. Going back to Guinea for a second, we're working in a place called the Nimba mountain range which is called the Water Tower of West Africa and it supplies water into Côte d'Ivoire, Liberia, Guinea and potentially water for up to five million people. It's also got some of the highest grade iron ore in it and is likely to be mined, how do we ensure that those people in Côte d'Ivoire who are hundreds of kilometres away are considered when the mining is going ahead.
	So yeah, looking for opportunities to use planning at the farm scale, at the community scale and looking at ecosystem services, having that holistic approach. Also then what are the opportunities to finance that at both national and international levels. I think the finance issue will really keep coming back in.
	A second issue that I want to talk on which has definitely been picked up already, but it's the food versus fuel issue I think, as you've said, there are vast areas now where crops are being planted for fuel use and not considering what people are going to eat. But also I think from my point of view charcoal and charcoal production is a huge issue. I mean even if we can just take the pressure off charcoal production in Africa that would be a huge win for biodiversity. So what opportunities are there? Certainly it ties back into the land planning but for considering fuel uses and fuel needs along with agroforestry and looking at it as a holistic problem and solution hopefully therefore.
	A few of you have worked on tea plantations but again the tea drying is usually wood used from the forest, and yes it might be better to chop down a eucalyptus plantation rather than a forest but then that will have impacts on soil quality further down the line, so having that sort of long-term approach to our alternative fuel uses as well. Also where we are using new technologies, so for example other opportunities for solar and certainly people have been talking about coastal solar-powered desalination plants, the investment will be huge but the return should be even bigger. So the question is around how do we get that finance in place, how do we get these new technologies in

	the ground and then also ensuring there is training for people who are going to be using them and that its new technologies and finances are in place but local people are trained in how to fix them and use them and hopefully get much money from them in the future.
	Then the final point I wanted to make was actually also about disease and links to livelihoods. So a quick fact: over 300 distinct emerging disease events have been recorded in the last six decades and it's accelerating. The majority of these emerging pathogens are zoonotic and originating largely from wildlife so therefore increased human animal conflict is something we're going to be seeing a lot more of. Obviously Ebola has impacted us massively, West Africa hugely, and I just wanted to talk about a specific example, we've just finished a sustainable livelihoods project with the European Union that was targeting bush meat hunters and sellers by providing them with pig farming. So ideally you're addressing a protein shortage, we are addressing the role of gender with the bush meat sellers and hopefully also targeting illegal bush meat hunting. However there is a huge link between pig farming and bats roosting and certainly in Indonesia, or sorry Malaysia I think it was, the Nipah virus with bats roosting in pig farms led to hundreds and hundreds of deaths. So for me there is a real question around if we're going to come up with these alternative or sustainable livelihoods are we inadvertently, given that the pressure now…the human animal conflict is increasing because we're now in a different situation where our protected areas are much more squashed in and we're going to come across more these zoonotic pathogens, are we going to have an impact on human populations through… We need to really understand that link more between how these diseases are travelling, vectoring I guess through into the human populations and we need to understand that before we start putting all these solutions in place to the things which actually make the problem a lot worse. So I think there's a really interesting lot of research potentially to be done around zoonosis and disease outbreak. I have a whole other list of questions that I think it would be great to answer but I should stop there for now.
MR:	Thank you very much Alison. So we do have all the rest of the time for discussion of course, but in fact the lead on the discussion Phil Franks has agreed to make a sort of response that might hopefully lead into discussion. Are you happy to do that?
PF:	Yeah. At least I'll try and link up a few points. So what I was going to say relates to my experience of perhaps 30 years now working in conservation in Africa, mainly forest conservation, and in agriculture and it perhaps speaks to what Liz was talking about, the pressure to intensify agriculture and in that process overlooking some indigenous practices and things that have been so important.
	Perhaps by way of a little story I would say my interest in this nexus between if you like the discourses on conservation, agriculture and food security and climate change came from a meeting that my then employer Care International organised with WWF to try and discuss what they had concluded was perhaps the biggest common interest between the two organisations which was around the global food system and WWF's growing realisation that it was the pressure of food demand and the power of the actors in the food system that in a sense was the biggest threat to their conservation agenda globally. There's this number that you keep hearing that by 2050 food demand will have increased by 60% globally and roughly half of that is to do with change in consumption patterns and part of that is to do with increased population and the change in the consumption patterns. There was a bit of a joke in the meeting that the elephant in the room is a cow, because it is beef that is more than anything else responsible for the increase in demand for food production on the consumption side.
	So then I started looking at the situation in Africa which I was much more familiar with than in Sub Saharan Africa and I found that the projections for the increase in food demand in some of the countries in Sub Saharan Africa were not 60%, but to give you

	some examples Ethiopia 280%, Tanzania 284%, between 2010 and 2050, that's over a 40 year period. That means in Ethiopia the production…sorry, I'm talking about cereal crops now, the production of cereal crops in Ethiopia, if it's going to increase by 280% that means it's going to be nearly four times what it is now in 40 years' time, in less than 40 years' time, same with Tanzania and how is that going to happen? So then if you start reading national forestry strategies or a lot of it is focused around this thing we call REDD, reduced emissions from deforestation and forest degradation, but pretty much every country is developing a strategy for how they're going to reduce deforestation and get results, financing from that. They are all optimistically projecting reduction in rates of deforestation and in the case of Ethiopia reaching zero deforestation by 2030. Yet if you look at Ethiopia, if it's food cereal production is going to increase by the amount that I've said it would lose three quarters of its remaining natural forest. If you project a business as usual scenario, in other words most of their, 70% of their increased agricultural production has come from clearing forests in the last 30 years, so if you project that trend they will lose a large part of their remaining natural forest, which of course is not what the forest department is saying when talking to the World Bank about financing for REDD.
	So there appears to be something of a disconnect between the discourses in the forest and conservation world and in the agri food security world. Tanzania the same, between 1970 and 2010, that's a 40 year period, the area of maize which is the main staple food and cereal crop in Tanzania, went from one million to three million hectares over a 40 year period. So if we project that again, 2010 to 2050, that could be again a factor of three if we didn't increase the productivity per hectare, that's another six million hectares of maize which would come a lot of it out of the areas of Miombo Woodlands and forests that are in Tanzania. Of course if you read the Tanzanian strategy for the forest sector it doesn't say anything like that, it says we're going to reduce deforestation, I think it's 1% per year it's going to be reduced and eventually eliminated. Ethiopia was so optimistic about their ability to do that that they signed the new Declaration on Forests in the last year which says they will eliminate deforestation by 2030.
	I don't pretend to be an expert on food systems but from my work in the forest sector, my work in the ag sector and my discussions with food security colleagues in my organisation in Care and in WWF, it seems to me there is something of a problem here that is not really getting…is being swept under the carpet or a lot of assumptions. Well basically the assumptions are around sustainable intensification, there's a huge assumption that in the Ethiopian, for example Ethiopia has a green economy strategy. There is a huge assumption that agricultural production will be dramatically increased through intensification, a combination of inputs and irrigation as you talked about. We all know what…when you…and you talked about the green revolution, there was a green revolution in Asia in the 60s, there wasn't a green revolution in Africa and there were good reasons why there wasn't a green revolution in Africa which lead us to suspect it might be quite difficult to achieve the ambitions of sustainable intensification that are currently being discussed.
	So what does this all add up to? Well also factor into this urbanisation. The population in Sub Saharan Africa in these countries we're talking about at least a doubling within the next…up to 2050 from now and that's going to be largely urban and that's going to change the whole food system as well and maybe it will increase demand for certain types of foods that are more easily transportable and storable, like cereals, and reduce the demand for things like cassava which are much more difficult to manage in the food system.
	So when you add all that up it just says to me that there is…there are some convenient myths that are being perpetuated by agriculturalists and forest conservationists that things are basically going to be okay if we do some sustainable intensification. The trouble with that is, well then of course if we factor…get the climate change folks to

	come along they also tell you that agricultural production could be hit by as much as 25% in some of these areas. So when you add all that up you get a scenario where a fairly chaotic situation where you can be sure that resource poor farmers who have little or no secure tenure over their land, they're going to be more and more vulnerable to land grabbing. Agricultural intensification if you look at Ethiopia, they've invested in fertiliser a lot but through systems that have left very vulnerable farmers having to sell their land to pay back loans for fertiliser, because they are not designed to be appropriate for very poor farmers in an increasingly risky climate. So it adds up to a rather awful scenario, particularly for poor small-scale farmers and it worries me that I don't…maybe I'm unduly pessimistic here, but it worries me that I don't see this reflected in most of the discourse that I read about, whether it's in food security or agriculture or in forest conservation, I don't see this. I see generally a much more optimistic picture. So in a way one of the reasons I'm here, I wanted to be, was because you're looking at Eastern Africa, I've looked particularly at Eastern Africa, to me I see these great dark clouds and I don't see much discussion about it and a lot of what look like convenient myths to me. I'm wondering maybe if I'm just in a depressed state and need to take some antidepressants or whether indeed there are some serious problems here that are lurking under the surface that we should be looking more closely at.
MR:	I'm sure the panellists have a lot to say in response to that but I think it might be better if you agree to get a few other comments from around the table and thank you very much for those very stimulating, albeit depressing comments.
	Can anyone cheer us up a bit?
IH:	I also want to cheer anyone up I don't think. So there tends to be a presumption in favour of food and in a sense it's obvious why, but I guess I was wondering to what extent. So Liz you talked about camel racing in Ethiopia at the beginning and then you came back and talked about a camel economy which sounds really interesting at the end. But the implication is presumably therefore that actually these other sorts of activities in certain circumstances can have a legitimate role even if they're not directly contributing to food production. So I was wondering into what circumstances…because presumably actually what people need is income rather than food and in a sense if there is more income in the system actually the prices will rise, that will create incentives for people to intensify their production, given other things as well. It's going to have to be market led I guess, it's going to have to be some incentive and maybe those non-food activities can generate the income that goes into the economy that creates other things that stimulates things to go on to more intensive agriculture maybe or covers the cost of buying inputs or whatever.
	But I was just wondering if there are some sort of rules about why we would favour non-food investments as opposed to circumstances where we say “No, no, we've got to feed local people,” it's displacing local food production.
MR:	Would you like to respond to that?
LW:	Yeah. I'm not sure I quite understand you. I think you misunderstood me in that… The case about the camels is that…so you have intensification in Ethiopia using irrigation around the Awash Valley for example and that grows the lushest, the most beautifully intensive fodder for camels which is owned and managed by Dubai farmers who then import it twice a week to Dubai and very little of that income will filter through into Ethiopia in my mind. The people who used to use that land and are now blocked from the water resources that the land covers as well, so it's not just the land but also the migrationary routes of people's livelihoods is also blocked. So I don't see that as a tremendously useful use of resources in terms of what it contributes generally to the local economy.
IH:	So rule one would be that local people could have security and rights in order that

	before that happens there is some justification in terms of the investment that is contributing to the local community to offset.
LW:	Exactly, yes. That's what I'm sort of saying…so I'm not totally against large-scale land production or commercial activities, the question is what is it contributing to and what are the relations to the smallholder. Because there are schemes which use outgrowers. I've yet to actually come across one that is really very good at producing good livelihoods really, but in theory one shouldn't be prejudiced against it just because it's large-scale and run by a business person.
IH:	So you could begin to set out the conditions…
LW:	You could but in practice I think it rarely works in my mind. But then I think what you are also talking about is saying we need a market generated investment in sustainable intensification…
IH:	Not necessarily market generated.
LW:	Like you said about income, income is useful and what I think from studying some of these systems is what is useful is when people can have control over their land and their livelihoods, produced some of the food for themselves, none of these systems are subsistence, and be involved in a market-based economy kind of on their own terms. Those are the interesting questions. Who is controlling resources? Who is gaining from the resources? I think as Phil has indicated that a lot of the new solutions that are being advocated are also coming with a kind of package of people who are promoting them, managing the resources and so on which don't filter through to those small-scale farmers, they tend to be controlled by other actors of a variety, be it the state or private investment or another government or even a local elite or something like that, it's not all foreign investors. The optimistic solutions I think do not necessarily filter through to poor smallholders and I think what I'm interested in is those debates which actually kind of think about I suppose kind of the old debates about farmer first, at least get people to have control over some of their production first and then also get involved in the market as well seem to work better.
MR:	Jake has a comment.
JR:	There's certainly plenty of bad news out there and Phil asked for some good news. The way we sometimes look at it is the international markets for certain commodities. Perhaps East Africa is not top of the list in terms of production centres for a lot of the soft commodities like the palm oil, the soya, the beef and so forth which are travelling around the world driven by consumer demand. But amongst that trade, that global trade, I think partly because it's very exposed in terms of it gets a lot of scrutiny of how those production systems work, you do see a movement in the larger companies towards straightening out their value chains from a deforestation perspective, which apparently accounts for about 50% of global deforestation through these huge web of international supply chains, the other 50% in sort of domestic, more subsistence context.
	So there is call for…this is basically a decade on the project in 400 companies working together to drive deforestation out of the supply chain, which is actually having some impact and it's running up against some buffers. For example the Chinese demand, Indian demand is still rather inaccessible to that approach, whereas the large corporations tend to be under heavier scrutiny and are making some inroads. Where I can't really provide any optimism for this is in the domestic context. You mentioned charcoal, a massive increased energy demand effectively at the expense of woodlands and all forms of biomass to generate energy. That doesn't seem to me to be under any form of effective management and whether it's capture [inaudible 0:56:21] or perverse subsidies or different departments in a government working in opposite direction, all of these things are plaguing progress in those kinds of areas, yet there's obviously…there

	are solutions which could be adopted at scale and financed at scale should those governments decide to want to do it. I suspect there is a mindset issue at the domestic level that not everybody is thinking about the same kind of priorities as we are, for often very good reasons, but it does have a limiting effect in those markets, whereas I think at the international level it slightly easier to see where the levers could be pulled.
	So I don't know if that cheers you up at all Phil, it's not all bad news but quite a lot of it is I think.
CG:	Phil's conference joke was that the elephant in the room was the cow and beef was the problem. Have I got that the right way round?
PF:	Yeah.
CG:	Well elephants have meat on them as well, as do a very large number of animals that naturally live in East Africa and eat food that would normally grow there. There has been a whole great movement in the past towards trying to make off takes from animals locally and is that an area where more consideration could be given if all sorts of other things like security of tenure and so on could be brought under more control?
MR:	Alison, do you want to comment on that?
AM:	Sorry, let me just recap because I was focusing on quite another thing. So use of elephants and…
CG:	Well if you put the wildlife much more into production systems and providing the resources that people need.
AM:	Yeah. Well I mean if we're to look at it completely scientifically why not? I mean like you said there's a lot of meat on an elephant. Probably I would say practically, logistically it's going to be quite challenging to ferry…sorry, I diverse but I was in DRC and we came across someone who had poached an elephant and just had too much meat and couldn't transport it and eventually tried to give it to us for free because he had so much meat it was going off. I would imagine probably what we would have to do is look more at the cultural or socially acceptable side of that argument. Much as we've seen in things like the whaling debates and I would imagine that elephants probably fall into that category where people being…I suppose the developed world are going to feel very uncomfortable. I don't know, because elephants have been eaten historically in Africa, where elephants hundreds of years ago have been eaten. I would imagine that the issues are probably more the Western society having a problem with that. I've never had it come up as a solution before. Farming elephants?
SO:	Feed a whole village for a week [inaudible 0:59:33].
AM:	I just wanted to very quickly touch on the market-based approach which is that I think for all that it can work in terms of supplying food a market-based economy or approach doesn't usually take into account natural capital or the values of ecosystems and things, so it may…
IH:	I wasn't suggesting a sort of naïve market right, but the market will be in there, the market has to be created though by government.
AM:	But I think it's one we have to be careful of because otherwise…a lot of the time our forests are more valuable to be chopped down and the land tenure where they can't be controlled so it's…
MR:	Chris was next and if anyone has any comments on the attitudes towards eating elephants or other mega-fauna.
IH:	Or recipes!
CG:	I haven't got anything to contribute on the last topic. A couple of thoughts but coming back on the various witnesses as you are grandiosely called in this gallery. One is

	when I was listening I was wondering 'Where's the evidence?' I'm not implying that you don't have evidence, don't get me wrong.
LW:	There's different evidence bandied around.
CG:	Yeah. I was struck too by what Phil was saying about people doing some back economical calculations. So you've got the question of where is the evidence? How do we do some back economical calculations and what might they be? The back economical calculations actually also require us I think to scaler whether it be farming and eating elephants or whatever example we might have, how do we integrate that into a larger system to see whether or not it would work and there's a social dimension to this also.
	So what evidence have we got? What tools have we got said the modeller. What tools have we got to put this together? It doesn't have to be mathematical modelling. How do we approach the dichotomy between demand driven and supply driven? Most of what we hear is about supply driven. Science will have the solution, they'll be enough land available and each of those might well be questionable for sustainability. What should we be doing about waste and about people's expectations for what we should eat? I hate mentioning that because I know we'll eat later and I hope we'll all feel guilty from the Downing fare. But I think the fundamental question is evidence, how do we scale that to answer some questions about whether we will get there and how we are more likely or not to get there.
	The other thing that I think about quite a lot these days is who or whom to influence. Who are the opinion formers that one would really think should be influenced in order to achieve what we would like to see happen, what we think ought to happen?
	It's easy to pose the questions. But I was struck particularly from what Liz was saying in the arguments for the indigenous and I think some of those arguments are persuasive but do you know how that would scale up and what should we do about it? So there's a question for Liz.
LW:	Well that's exactly what people say is that these things can't scale up.
CG:	Well we shouldn't…we need evidence which you just said.
LW:	In the sense that I'm sort of saying… Okay, maybe that's always been the criticism but it's better than replacing them with a wholesale system that is completely malfunctioning, it's really…sort of thing. But I think we need more evidence in the African context, I think compared to other areas of the world what we know is very poor and people bandy about all sorts of different sorts of statistics. Take urbanisation for example, some people say it's spiralling in a way which is obvious, right? Other people say actually a lot of reverse migration has taken place over recent decades in Africa and it has stagnated in various parts of Nigeria, in Zambia, because of the impact of various economic crises recently. So there's a lot of debate, even on climate change, the monitoring organisation says the number of weather stations are eight times below what is expected and that's something very straightforward to measure. So that's an indication of if you like a kind of information gap. At the same time, I think like some people have talked about, like Tinashe talked about, there is a lot of new technology available and people starting to collect data themselves and so on and so forth. So there are interesting ways in which researchers can engage in trying to get a better picture so that then you might do something which is a little bit more realistic, rather than actually just "Well we know Africa is never going to scale up," or people are really poor and [inaudible 1:05:09].
JW:	I had a couple of comments about zoonotic and emerging infectious diseases that Alison touched on and I have got some fruit bat recipes but I haven't got any elephant recipes.

	So firstly your comment about Nipra emergence in Malaysia, absolutely this was associated with fruit bats living on top of a huge pig farm that sent piglets all over the country for fattening. The solution was to cut the fruit trees down around the pig pens. It's not that there is a natural symbiotic relationship between bats in the fruit trees around pig farmers, but it's obviously having an industrial scale production and the movement of animals poses risk for transmission of disease, because animals carry diseases with them, just as we do.
AM:	Yeah. I was going to say, I did have a note that this has been proven, that the Eidolon Helvum which is even wider throughout Ghana is found to have Ebola in about 40% of a bat survey did have Ebola in it.
JW:	Actually so that's our work on Eidolon bushmeat and the work we do with the Institute of Zoology at London Zoo, [inaudible 1:06:27]. In fact Eidolon which is one of the most common fruit bat across Sub Saharan Africa and widely migratory, is by everyone apart from one research group's findings not infected with Ebola. There's a recent paper that has come out that a lot of us find rather surprising in relation to its results. I think it would be a mistake to get bogged down in the Ebola and bat debate, but I think that one of the issues in relation to a lot of emerging infectious diseases and zoonotic diseases, and many zoonotic diseases that are very well-established aren't really emerging but they cause massive burdens of disease. There is frequently a high burden of zoonotic disease in indigenous agricultural systems and if you're dealing with cattle and other ruminants globally then disease which is likely so much to be a nasty burden on farmers are found very commonly in indigenous systems. So I think that we have to be careful to distinguish between practices that are associated with zoonotic transmission to us, to people. Sometimes indigenous is bad and industrial can be good in relation to that one simple question. I think it's a real mistake to separate it out from all other things. I'm not trying to condemn any respect for indigenous agricultural systems but I think we should be aware that they are in many cases associated with real problems for the people who look after and often live very closely with those animals.
AM:	Sure. And I think my point though was that…just using Ebola as just one example of it, was that as we start to try to find different…you know we're asking people to change their behaviour, we're asking people to not go into the forest and hunt and certainly when I was in Congo there's a lot of disease transmission through people just finding dead animals and eating them and things. So we are asking people to change their behaviour, to do different things, and we may not understand how the transmission of diseases is working and I think it's just something that [inaudible 1:08:48] saying we just need an awful lot more questions answered about how it's jumping from animal to person. Then therefore if we're going to be coming in with a new panacea on how to change…so well then it will be really good to know that we're not going to do something that's inadvertently going to cause…
JW:	And there are all sorts of unintended consequences in terms of advice about behavioural change where there is not a holistic understanding of what it's talking about. I think it's something we have to be very cautious about, absolutely critical.
MR:	Tinashe do you want to comment at all on what we heard from Phil Franks about whether one can feed this rising population?
TC:	Well yes, and also about the issue of food and non-food because I think, yes, we may worry about producing food and maybe we don't need to worry about producing food. People say "Well we need the evidence", and I was going to say [inaudible 1:09:50], the problem with Africa is the evidence may be relevant today but because of the instability it won't be relevant in a few years' time. So I was going to say maybe in Zimbabwe we have had a change in the ownership of the land so people own some land, and they're not growing maize, they're growing tobacco and they're making a lot

	of money because the Chinese want to smoke a lot of tobacco. But we don't know how long it will last, we don't know how long these people will be on this land. So we have some evidence now that actually it works, so we have small-scale farmers producing land food crops and making some money and buying some food and, yes, again the problem of course is development, they can't afford to actually cure their tobacco crop and so they are cutting down a lot of forests. So if we had some commitment in terms of cutting down deforestation that may be a problem. But I think again it's the problem of evidence. So the evidence we have at the moment, back of an envelope calculations makes that it's going to be bad but we don't really know because it's all so unstable and we can't predict much. All we can do is work what we have and, I don't know, try to help from the grassroots hopefully and then change things from there.
SA:	I think these are very exciting presentations and coming from Africa and being a part of…I'm just wondering where the actual problem is and when you are planning whose figures you actually use? Because if we are really using the right figures we should not be seeing a drastic change over the last 50 years, so where is the problem, right?
	Now let's look at the issue of new varieties. When we are thinking of introducing new varieties what elements do we have to consider in the planning? How integrated is our thought process for the project, right? We think about varieties but these varieties must go in some types of soil and the seats must be bought by some people. When we talk about farmers do we talk about the guys who actually can produce in two hectares or do we talk about my grandma who must go to buy the new seeds? You see what I'm saying?
	So I think in terms of planning to see how can we actually make change in Africa. My guess would be we need to change the way we plan for the continent. So the question is where is the problem? Is it new leadership or is it the way we do things? So I think one aside problem is how integrated can you actually make sustainable livelihood on the continent, where is the problem?
TC:	I think the problem is at different levels. So we in Kenya for example for this wheat programme that we had, we are going to produce a wheat production handbook to show people how to produce wheat. The last one they had was last August in 2001, so it's obviously out of date. Then we came to the problem of what varieties are we going to use, but obviously it's not just the variety, it's not just the seed. We said well the problem is the politicians are importing this fertiliser and they are recommending that we should use that, it's because of the way things work, the way subsidies are sourced. It's not based on what the researchers think but it's based on what connections the person who is doing the sourcing has and then we can't run away from that. This is just the way things are. This is just the way subsidies work in Africa. If someone has a connection in China they get some fertiliser. You have to work out how do you use it. So what we are doing now is how do you supplement for the deficiencies that have been created by this fertiliser because it's coming, we cannot change it, this is the way things are. I suppose you can say it's the leadership but we can keep saying that for a long time, but I think we need to find solutions to work within that system where we still have leadership.
SA:	That's my point. If we don't register the situation we must be able to change it, because you can't say "This is how things are run and therefore give up, we don't need to raise our hands up."
TC:	So for seeds also for example, we know that seeds…
SA:	So let's do a plan B, research. What is the plan B to the non-situation? What has been implemented today, our children's children might implement, may implement in the next 30 years, but let's work then in that direction, things may be okay.
MR:	Okay. Let's take a short break now and we'll convene. Although it says 'Break up into

	three' we decided there wasn't enough overlap between the three panellists that we'll actually all convene together if that's all right and have the remaining discussion around the table. But a short break, about 10 minutes to get some more tea and coffee.
	After Coffee
MR:	I'd like to welcome Professor Alison Smith who is one of the organisers of this particular topic for the forum who is here now. Also we're going to hear a bit now about a very exciting project going on elsewhere in Cambridge on the smart villages.
SF:	First to apologise for being very late, we just finished the smart villages workshop and trying to get across from Grange Road to here in the middle of rush hour was a bit impossible.
	So smart villages are an initiative between the University of Oxford and the University of Cambridge which was launched this year. It's running for three years and it's trying to look at is there a concept like a smart village because everybody is talking about smart cities. So are we just being perverse or is there a purpose? So the first thing I'd like to say is, and Tinashe sort of ended on that point, because Tinashe and I worked on a project before, but even if food security in Africa is resolved it doesn't mean everyone wants to be a farmer. So where we come into this is why do people go to the city, well the Lewis model says they go to the city because they go for jobs, but in Africa they've been going to the city because there aren't opportunities in rural areas. The research that we did in Tanzania last summer in a village called Terrat showed that the older generation didn't want their children to go and live in the city, even if they were non-poor, if they were more like $20 a day rather than $2 a day. The children also wanted to come back but they didn't want to be farmers and for me that had a strong resonance having worked in India and China and Malaysia. Nobody wants to be a farmer because it's a hard life and if you've done well your children don't want to, but they want to live with their parents. So one of the challenges is recognising that the farmer does not eat with a more rural livelihood. One version of this of course came through in terms of pastoralism and thinking of other folk and other lives. But new livelihood sources in rural areas.
	So our project is using a slightly odd angle, we're looking at off grid electrification as a platform to bring communities together. Off grid electrification is a win-win because everyone wants electricity and in the case of Terrat there was a wonderful anecdote where the story was a little boy collected all the mobile phones, runs to the side of the mountain, he charges them all and he gets paid a couple of shillings to come back up. So even if they have electricity access for everyone does it mean that they can go on to productive enterprises?
	So we're just beginning but…and I know this forum has looked at global issues for the last year, we're coming really from individual villages, trying to understand with them what are the challenges of having brought electricity that these villages can be brought off grid for themselves, usually at the moment through PV or micro-hydro, but what do they want to do and where are the challenges and they are very different. In the East African context we are now going to hold a masterclass where we're learning from the heads of different villages across six countries. So I'm leading a masterclass in early July based in Terrat where they've gone from three years ago no electricity to now using the electricity, not just for barbershops and livelihoods, but they've actually got refrigeration and they've produced cheese for which they've got a Tanzanian equivalent of a cheese mark. So they've gone from being almost nothing to quite… But it could be a flash in the pan. Is it sustainable? Is it scalable? There hasn't been an evidence-based baseline, we want to go and do it now, take it forward, but we're bringing the village level leaders from Ethiopia and Rwanda, more powerful state centred development model where the state is driving it. Kenya, Uganda, Tanzania which are different and what we've learned if anything in the last four years is not even East

	African country level development models. These are village models, they may go up to county equivalent levels but there's a lot more to learn. I'll stop there.
MR:	Thank you very much. I know you wanted to talk and also Sue wanted to talk.
HSB:	Thank you very much. I think I would like to thank you very much, all of you who have presented but I tend to think that in Africa we are so much misinformed about what's going around us and that's why it's not so much valued or that's from the education we get. The education system we have doesn't tell us much about what we have and how to value it. Then you find this elite, and one of you mentioned that, and not appreciating what we have, you can name it. So that's why our policies are not well designed to favour us because if you know the value of what you have, and ecosystem or what that has value, then you cannot destroy it, you cannot change it. So we have a challenge ahead of us and that's why I wanted to ask isn't it a problem of how we are educated to always think that the solution will always come from outside. You can imagine the seeds, the seeds which you talked about, even going ahead to call them improved, you know what is there, whether it is good or bad. I mean it is something that has to really think about. I mean even which is more adaptable and sustainable and resilient but you're eager to change, the cows have changed, the sheep are changing, beans are changing because of improved and probably driven by economics and greed. The project I'm working on here, CAPREx project is trying to develop education materials to try to make our students appreciate what they have. It's a big problem for Africans and I think we have to work on it and that's coupled with government, education needs to pull governments. If a leader is not informed he will give away chunks of land to other people because he doesn't understand what it means. So we have a serious problem there. Our education is not ours, we have not developed a Ugandan education system, no, similarly, Kenya or Tanzania [inaudible 1:40:15]. So we have a problem and therefore what you have said, solution coming from out, there are so many people it has so there's a lot of confusion there. The Germans are coming, the French are coming, everybody is coming in with all different sorts of models of research, big serious confusion going on. So I think we have to go back to the table and these are the two questions you see: were we educated, yes, we can speak English some of us, but we know the value of what we have then keeping an elephant is better, keeping a tree is better than and you learnt it in class, it's better than charcoal, we have it but we can't really engineer and it only works somewhere. So that's the kind of situation, we have to rethink the value of our ecosystems, we have to rethink…that each ecosystem has something to offer, whether it's a river or a forest or whatever. But if you abuse and you want to change the river to forest then you are missing the point. Thank you.
MR:	Are they too relaxed about the land grabs?
HSB:	Yeah, now the land grabs…
MR:	Well I guess that's part of your point.
HSB:	I will give you an example. If the communities do not value what they have then they cannot get much out of it because they are not favoured by the national poor governors, national market and international market. Even if they can produce something on that land they will not be able to do it, so then they rush to town and then they leave the villages and then these governors come and they grab the land because there are no people using that land. That's how many Africans have lost their land and if they are seasonal pastoralists, when they are moved from one end to the other like the ones we've mentioned and they will spend a season or two without coming back, when they come back and they find the problem, some people already [inaudible 1:42:33] causes a fight already. I have already seen that in the Sudan and those things are still going on. So we need to really understand the way that is Africa. By the way is Africa going to develop in the same way like Europe? What we have…we are being

	rushed, there's a rush. In Uganda where there is two rainy seasons, very long seasons, we have capacity to produce food for all Africa, but we have not been given a chance to do that because of the confusion.
MR:	Any response to that?
AM:	Yeah. So I think education obviously is key and it will happen at many levels, education at school level has been part of a very, very long-term solution but it's not going to solve problems tomorrow and then… Absolutely there's education…people talk a lot about individual projects that go and… I mean certainly our project in Uganda where we're working with communities to map out the ecosystems and making people aware of how the ecosystems work and therefore what is actually valuable to them and empowering communities from that grassroots level up is great. But then that relies on having a strong civil society movement that can then put those arguments to perhaps the government or the local government levels and so slowly you move up the chain. Potentially in Uganda the government would care about understanding how those ecosystems are important to the everyday people on the ground, but I think there's a lot of governments in Africa, across Africa that do know very well the importance but don't support the civil society to actually benefit from the resources.
	So absolutely education has to be part of everybody's plans, projects, you know I think is key but I don't know that's going to be the standalone, whether that's going to be the immediate solution. Therefore it kind of goes back to the question about who do we target and also to tie that into comments on whether it's industry, I think possibly industry is a, dare I say, safer bet. A lot of industry are starting to take the initiative themselves without pressure from above, but then we are also seeing the likes of Rio Tinto who have signed up to performance under six who are now realising that that's really, really expensive and where they can get away with it they are not going to follow through on their obligations. Obviously targeting of governments, there's plenty examples in Cameroon where people have actually been just shifted off their land for American…Herod the Heracles example, I know marginally, but people were absolutely just moved out by diggers one day because the big American Cargill company came along and had been promised this land. I'm being [inaudible 1:45:36] again.
	I think possibly there has to be targeting of education on many, many levels, absolutely, long-term planning with education and then absolutely I think targeting international companies, personally I think that's where we can really put the pressure on. Certainly where the companies are British, American, that's where we could be focusing a lot of our pressure because I think then with targeting governments there are other issues such as sensitivity neo-colonial ideas and things and that can sometimes… I know in DRC at the moment with the Lesotho debate, if anyone goes in and says “You shouldn't be drilling for oil in Virunga,” like “Don’t tell us what to do with our natural resources” and fair enough because like you say in Europe we only got better once we had destroyed everything. So the rush on Africa and I suppose the pressure, and the reason we're rushing is because you've still got some and how do we stop Africa from being like Europe.
SO:	I'm always interested in how particular ideas or narratives or storylines get a grip on, because they can be as powerful in effecting or preventing change as evidence or facts. I think Phil picked up a couple of really quite conflicting ideas that are circulating apparently happily and independently in spite of being in conflict and I thought Liz argued very eloquently that some of the very long-term advantages of indigenous agriculture, such as resilience to quite big swings in environmental conditions, are overlooked to use your words. Yet I'm struggling to grasp why that happens. Why is it that if indigenous agriculture, to take Liz's example, has resilience and now resilience is a big deal, I know we talked before and you said actually some of these systems have had resilience for millennia. But why is there a kind of widely accepted belief that it can't be scaled up or it can't deal with some of the issues that are being faced? Why is

	it that a narrative preventing, stopping even, deforestation but also increasing food supply or change in diet, how can those stories each get a grip? So I'd find it interesting, not knowing anything about this specific situation, I find it interesting to know how these powerful ideas take hold and help to shape futures.
MR:	Phil do you want to comment on that?
PF:	Yeah, and to inject a little bit more optimism into my contribution. I mean to respond to that I think it is very interesting that there are these narratives that are somehow disconnected, but it's almost a convenient disconnect because if you try to connect dots you are faced with some very tough issues and especially I would say there are potential losers. I mean as our colleague from Uganda says, Uganda is perfectly capable of producing four times as much food as it does now and so is Tanzania and DRC and many other countries. The losers will be the forest conservationists and certainly the REDD community and biodiversity conservation and also small-scale farmers who have very insecure tenure or who are likely to go bust if they invest in inputs and they have a bad year. Those are the people who are going to suffer. But it maybe suits the political class to keep those narratives happily narrating to each other and not cross fertilising because that's when they realise they've got a problem. Also maybe to be a bit more cynical about it there are some vested interests I'm sure in the private sector in the sustainable intensification narrative, they don't want that…I mean it's convenient to keep pushing that as the way forward and there are likewise in conservation [inaudible 1:50:35], it's not private sector but nobody wants to… The conservation NGOs they could also go out of business if you really faced up to the worst-case scenario of what might happen in Africa, it's really bad news and your donors won't be very happy to hear about that. So it's quite convenient maybe just to keep things muddled and chaotic and nicely separated the way they are.
SO:	Can I come in as well? I think first of all that indigenous agriculture does have resilience and I think a lot of good things which have often been underestimated and undervalued because they've been practiced by Africans by themselves quite happily for a very long time. So why have these narratives that it's completely rubbish and useless and not up to the job or can't be scaled up, why is that being perpetuated? I'm afraid…as well as the things that Phil has identified really well about vested interest, I think it's worth understanding that the developments have a really long history and we have to look back, which comes a little bit to what our friend here was saying in that Africa has long been understood, or rather misunderstood by outsiders as being in crisis, as being incapable of doing its own development and that has legitimised the removal of resources from the hands of local people in the state or to private investors. And we know this is true so we have narratives like the environmental degradation narrative of the 1970s which shifted international policy for the environment and towards livelihoods and it's well understood now to be really baseless in terms of the level of crisis that took place in the 1970s. So these narratives, like you say, are extremely powerful and there's a long history of the way in which crisis narratives are perpetuated which promote the kind of, basically as Phil says, the kind of certain powerful interests to some extent and rather dirigiste policies often, putting resources in the hands of other managers and for other purposes. So it's a long cultural history here of the relations between different people. So what would be…? Certainly in the work that I'm familiar with what happens is that a particular storyline becomes very dominant at a particular time, it may drive policy change, but then sooner or later it will be challenged by a different discourse and then that will rise to prominence or not. What would be an alternative message or story to counter the one that you were critical of?
AM:	Well at the moment all roads lead to the food sovereignty debate which talk about the need for a global movement which gives people control over the food they produce to some extent and looks at these global food chains. So that's something I think which is increasingly of interest and at the same time while all these processes are taking place there are also constitutional changes that are taking place in some of the countries

	we're talking about which are actually trying to give rights to local people. We've talked about tenure security and there's also people talking about cultural heritage, so there are kind of grassroots civil society movements at the moment which are doing things like patenting a REDD goat for the Samburu, I don't know if it's a REDD goat or whatever, but people are using this as a way of engaging in these debates through new constitutions from about 2010, trying to challenge… So it's not necessarily talking about food security and climate change which are I think discourses which have been hijacked to promote particular discourses to some extent by different actors raising their profile. So there are other things going on which are more grassroots civil society sort of actions, but whether or not they will…they will probably just be replaced by another big narrative. That's the history of Africa, it's so much easier because it's so heterogeneous.
HG:	One area I'd like to draw attention to is a sort of top-down problem that I don't think we've addressed which is the extent in terms of overseas aid and so on in terms of agriculture and so on, it leads to the development of commercial crops for production and export relative to local development and we haven't really considered that this afternoon. But the other more positive thing I'd like to take is this sense of education and empowerment, that activities through the leadership programme or through the CAPREx programme and I think the key message there is one whereby rather than the…getting the expertise of local folk to talk to local folk about their understanding of markets or better seed varieties or agricultural practices is the way to disseminate good practice, rather than to have a bunch of, can I say it, shall I say it, colonial looking individuals coming down in as their white suited experts.
TC:	I think that is a good idea and in this project, I keep referring to this project because it's really been an enlightening experience, we're trying to produce this handbook for how to grow wheat. So we say "Can we help it, update it?" So different scientists, agronomy and soil scientists, processors and food scientists contribute their input. But I said "Well can you then get someone to edit it in the UK and format it so that it looks nice?" They said "No, why would we do that? Why don't you find someone in Kenya to do it?" I said "Well it will take a long time for us to find someone to do it." So in the end it's going to come here so that we can actually do it properly and do it fast and then the project ends, but then we can't get it brought back here again for updating, that is the problem. I suppose it's a problem of aid and just how we've worked. We have tight deadlines and if they're going to drag their feet and they know they can drag their feet and make sure that it will actually come back here and then we'll do it here. It's just the problem of aid I think. I think we just need to find out how we can manage within that sort of context, manage how we actually change the behaviour on the ground.
AS:	To add to Tinashe's point, within aid it's important to disaggregate. Agricultural extension work has seen a real decline in aid budget and has become negative between 1990 and 2010 and as Tinashe knows better than me one of the biggest challenges when you talk to colleagues in rural Africa is there is a complete lack of actual technical information that they can get. So one of the things we did with the BFRA was providing this handbook and journalist said "Look we don't even have a discussion about these things, it's just not talked about." So that's 20 years which needs to be reversed. So one of the reasons for…I'm not saying smart villages is going to be the solution, we said "Okay, what's going to work where people actually talk about what they want to do, where they want to go." And from the earlier work that I did on looking at youth and education one of the biggest challenges is even the educational system that is provided has no connection with where the jobs are. So you've got three gaps: you've got an educational gap which has been to some extent remediably improved by the Millennium Development Goals, but then you've got a skill gap, there are no jobs for what they've been trained to do and then you've got an employment gap and in Kenya this is particularly felt because of that rapid transition and urbanisation.

	So it's a big challenge. So when you say "How do we improve agriculture? Is it good seeds, bad seeds?" one of the stories is we need a debate in African rural communities about what they want to grow. So part of it is where do you want to be? I just think disaggregating aid is probably critical to understand what's happened.
MR:	Do you want to come back and then…?
PF:	Well yes on that, because I used to be a terrible Luddite when it came to things to do with computers and the Internet and I remember when I was working in south-west Uganda some people came and said "We want to set up a computer in a school and get people market information" and I said "You're out of your mind." To me when you're talking about platforms I hear the power of the Internet as a communication platform in all its various forms and it seems to me sort of screaming at us for empowering grassroots more process driven rather than technical fixes, but I just don't know what form that would take. But if you want my positive contribution to counter my negative comments, to me there somewhere lies part of the solution.
MR:	Stephen did you want to…? Okay, you Gavin then. Birds.
GS:	No, I wasn't actually going to talk about birds, funnily enough, I was just going to comment on really…it's striking, I was at a meeting recently in India where so many of the same kind of points have been made and particularly interestingly I think in the current context, in a post-green revolution context in India making the same sort of points about indigenous agricultural systems being the solution to some of the environmental degradation from overuse of chemicals and so on and more sustainable future agriculture in systems there, which I think is interesting. But I think the point I wanted to make was about…comes back to the education side of things as well and the knowledge exchange side, because one of the things that was really apparent in India at this meeting I happened to be at was about agroecology and those of us who had come from the UK to talk about agroecology we were talking about it as a science and we were interested in how you can talk about biodiversity and agriculture and pollination services and so forth. The people from India who were talking about agroecology were very much coming from a sort of lifestyle choice, a philosophy which is more like the organic movement in this country and it seemed to me that there are real parallels here and there are real challenges about how you actually get ideas around sustainable intensification and new practices out into communities. Because the organic industry - probably the wrong term - the organic movement here to my mind is quite often too set in its ways, too dogmatic about issues around say GM crops and that sort of thing and that actually is a barrier to them getting some of the ideas which might be more acceptable to the industry of agriculture as a whole accepted. I saw quite a lot of parallels with the Indian agroecology people being very, very bullish and dogmatic and basically one of them was like an Indian Ian Paisley shouting at people, very scary, and that isn't something that I think a lot of people would find particularly persuasive. So I think I'm just interested in approaches for taking these sorts of…the approaches…again it comes down to the colonial point about how you get these kinds of messages across to people and what the right way of doing it is. How you get the scientific evidence for systems which might be sustainable at small scales and then you can possibly scale them up and how you get that out into the wider community.
MR:	Okay, last comment there.
ROO:	Just a quick one. Thanks for all the comments but to add to what we heard earlier, I was just going to say that part of the Cambridge Africa programme our philosophy is to work with African researchers in collaboration, in partnership through capacity building, through mentorship, to support the African researchers to solve African problems in Africa. If there are issues of food security we're not going to solve it from here on our own, we have to work with the Africans to do it locally, be it at the grassroots or at the high level, you need to engage in conversation and discussion. We cannot go in and

	just tell people what to do, that's not going to work. But also often at times the messages coming through are negative, we need to find the success stories no matter how small they are and highlight those to give confidence to people in Africa that actually we do have a way of doing things that may be different to the rest of the world, but they can work. We know what the problems are and we need to get the solutions ourselves with support from the external. Thank you.
MR:	We've got to the time for drinks but very briefly I'd like to ask the panellists if they have any very quick remarks before we close. There'll be more discussion over dinner but if you want to say anything briefly now.
LW:	I was just interested by these final remarks and about CAPREx in that the sorts of things that China is talking about in terms of getting people together to decide what they want in the future. What is interesting about this is that that in a sense used to be taken for granted, I mean I don't underestimate what you're doing as novel in many ways, but the idea that we didn't go in and tell people what to do, that would be the starting point for a project, I think we've gone back in time but I think doing development in that way it takes time, it's messy, it's problematic and everybody basically got bored and wanted to have some brand-new spanking development which is going to change it. So we need to make sure that those messy, difficult, slow processes are supported because they do work I think. The other thing was just as well is that the people who are in Africa, I think as the underpaid, overworked academic at Cambridge, whatever difficulties I have I think an academic in Africa has them tenfold when you look at their teaching responsibilities and so on and so forth. So giving them some time to come and do research and have personal development is really, really important and so joining up these different ways are actually some of the most important things that we can do. Because there's lots of really great stuff is what I've been trying to say going on already in Africa that we should be celebrating, but there are some really serious problems which are undercutting basic functionings which is limiting them. So things like providing sabbatical time for people to work out what they think they should be doing and asking people and giving time for that, that's the most valuable thing we can do.
MR:	Alison, any last words?
AM:	No, just to really repeat the same thing, absolutely solutions should come from the ground and just a point to add on, we were talking about donor issues, I think that's somewhere else that problems can be messy and difficult and I think certainly something that I grapple with is donors want to tick a box that says they've built so many schools or done these things and actually that can be a real challenge as well is finding the financing, so more research and financing will actually help address the problems on the ground, would be really useful.
MR:	Tinashe, any last words?
TC:	I think I'll just say for me because I work in the seed systems there was a time when I Googled seed systems EU, you don't find anything on Google, [inaudible 2:06:59], Google seed systems, Africa, there is a lot of results that come up. So we may, as you say, have a lot of discourses and a lot of ideas about how we want to solve Africa and there's been a lot of studies and ways of wanting to think about it but I don't know, I mean how do we then come to actually do what we want to do? I just worry about the evidence and producing more evidence that is sometimes verifying what we have read and not really helping the situation on the ground. I think that is our challenge really.
MR:	Thank you very much. Let's thank especially our three witnesses, panellists, and thank everyone else for coming and all those who can stay for dinner we'll be able to have some more discussion over dinner, but now there's some drinks just downstairs. Roz, nothing else you need to say now?

RA:	No I don't think so. The next forum and the final one of the year is on June the 9th and it's actually going to be about how do we respond, so we've been talking the whole year about land use, land use change, supply and demand for resources, so that last one will really try to square circles and come round and say "Okay, we've talked a lot, now what do we do?" So I'll send you some more details about that.
	END OF AUDIO