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**Strategic Foresight to inform investment  
for food security in Sub-Saharan Africa**

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(Drs.) Ferdinand Meyer, Lulama Traub, Rhoda Mofya, Leonidas Hitimana, Ismael Fofana

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## 2 Executive summary

In this project, we explored the critical drivers of change that will shape the future landscape of agriculture in Africa. We combined the input of quantitative models of agricultural supply, demand and trade, with the insights of more qualitative assessments of African agricultural potential in order to obtain a comprehensive and internally-consistent view of how food production, consumption and trade are likely to evolve – and their implications for human well-being. Among the most important drivers of change are those of socio-economic change – namely, population, urbanization and income growth – which have direct influence upon the evolution of diets and food consumption patterns into the future. The dimension of urbanization, in particular, was identified as an important dimension of human and societal change that will shape Africa's agriculture, within the foresight-based assessments that we reviewed. On the supply-side, one of the most important drivers of change is that of technological change in agriculture – which encompasses both the seed technologies that go into crop production, as well as the labor-saving inputs of chemical and mechanical inputs, that can be a significant dimension of transformation within African agricultural systems. The other critical driver is that of climatic change, which has been projected to affect a significant portion of Africa's agricultural output of cereal, livestock and other commodities. Whereas there is still a good deal of uncertainty over the region-specific climate outcomes (i.e. temperature & precipitation change) embedded in various global climate projection models – there is widespread acknowledgement that it will present a serious constraint to future growth potential, and is already being felt in terms of ongoing variability in climatic conditions.

One of the important dimensions that we added to our assessment of African agriculture is that of farming systems, which provided a useful lens for looking at the agro-ecological underpinnings of crop and livestock systems, and how they are distributed over the continent. While there is still much work to be done in differentiating the supply response of large-scale economic market models to fully reflect the heterogeneity embedded in farming systems, we have managed to use the farming system perspective to better guide and focus our consideration of drivers of socio-economic, environmental and technological change and how they might combine with targeted policy interventions to affect the future evolution of Africa's agricultural landscape and its ability to reduce the levels of poverty and malnutrition that persists stubbornly into the medium-term prospectives.

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## 3 Introduction

In this project we set out to understand the key drivers of agricultural futures in Africa and to identify important areas of improvement in both methodology and data that could be applied to foresight-based assessments of African agriculture. This project was conceived as a means of improving the state-of-knowledge of quantitative work on African agricultural growth, and to provide a basis for better integration of knowledge of the biophysical characteristics that underlie African agricultural production – and the important drivers of change that are likely to push the demand-side of Africa’s agricultural economies. Among the key elements of that we considered in this project was that of Farming Systems, and the way in which they help to define the overlay of biophysical and socio-economic characteristics on the agricultural landscape. We made use of recent efforts to update the work of Dixon et al (2001) on Farming Systems, and integrated the delineation of farming systems boundaries with the quantitative modelling tools that were applied to the forward-looking assessment of agricultural supply, demand and trade in Africa.

The principle objectives of the project were to:

- Evaluate the current state of knowledge about African agricultural futures and point to the gaps in methodology and data that exist
- To make concrete steps towards improving foresight for African agriculture by making better linkages to the prominent institutes, analysts and researchers that carry out forward-looking assessments within Africa and to draw upon some critical sources of information and knowledge that come from important research efforts such as the *HarvestChoice* project<sup>1</sup>, co-led by IFPRI and the University of Minnesota
- To synthesize the insights and knowledge from current qualitative and quantitative foresight efforts on African agriculture, so as to identify the most important interventions and investments that can be made to improve the performance, sustainability and poverty-reducing potential of the sector.

These objectives encompass the overall goal of the project – which is to provide the ACIAR and AIFSC with a better understanding of African agricultural futures, and where the major uncertainties and opportunities for intervention and further research lie.

In the rest of this report, we describe the activities that were undertaken in the course of the project, and the progress that was made towards achieving the project objectives. We will discuss the insights gained from a review of the literature and an expert consultation, the gaps that we have identified in the methodology and data that is applied to foresight for African agriculture, and point to some promising approaches to improve foresight and the lessons that we’ve learned so far.

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<sup>1</sup> See: <http://harvestchoice.org/>

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## 4 Activities undertaken and progress made

In the course of the project period, we undertook a number of research activities in order to achieve the objectives that were described in the previous section. Among these activities were the following:

- A comprehensive literature review of forward-looking assessments of agriculture in Africa that could contribute to our understanding of current trends and future growth potential of the sector
- Establishment of strong links with other researchers and policy institutes doing foresight and forward-looking assessments of African agriculture
- Illustrating the increased analytical power provided to foresight methods by linking a knowledge of farming systems with forward-looking economic models of the agricultural sector

We were able to complete all of these activities and make a considerable amount of progress in realizing our project objectives. In terms of the literature review, we undertook a study of a number of important global and regional assessments of agriculture – some of which are closely linked to environmental or eco-system based studies, such as the seminal Millennium Ecosystem Assessment (MEA 2005). We searched the recent literature for studies which were able to draw upon qualitative and quantitative methods for assessing the performance of African agriculture, and how it is likely to evolve in the medium- to long-term under a plausible set of driving forces. We synthesized this literature into a paper that provided a background for the consultative study that was carried out in October 2012, with a group of experts in agricultural markets, institutions and policies.

The convening of this meeting – over the period 24-25 October 2012 in Pretoria, South Africa – constituted the second major activity of this project. Namely, to establish strong links with other researchers and institutions doing quantitative, forward-looking assessments of agriculture in Africa. Among the groups represented in this workshop were the following:

- The Bureau for Food and Agricultural Policy, based at the University of Pretoria
- The University of Stellenbosch, in Cape Town, South Africa
- The Indaba Institute, based in Lusaka, Zambia
- The OECD Club for the Sahel
- IFPRI headquarter and regional staff

We were unable to get a representative from the Tegemeo Institute in Kenya to attend, due to the compressed time frame within which we had to organize the convening in order to fit within the project timeline. Nonetheless, we were able to get a good representation of policy experience from Eastern, Western and Southern Africa to have a very useful and constructive workshop. The details of the project workshop, are contained in Appendix 1 of this report.

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## 5 Current state of foresight for African agriculture

Many of the major forward-looking studies that have been done in the past, have given relatively coarse treatment to sub-Saharan Africa. This has arisen, due to a number of factors which we will name here. Firstly, the global nature of the assessment tools that are typically used for forward-looking economic analyses tend to require a fairly aggregated representation of regions, in order to maintain computational tractability. This, combined with the fact that Africa tends to have a relatively small share of global trade in agriculture, in terms of value, means that many researchers will want to either leave Africa as an aggregate region, or else combine it with other minor regions within the familiar residual representation known as 'rest-of-the-world'. In some cases, the relatively poor quality of agricultural statistics for individual African countries tends to encourage researchers to 'hide' such problems by adopting large-scale aggregations of the sub-continent, so that the influence of such statistical errors is reduced. In other cases, the attention of researchers is drawn away from Africa due to the fact that consumption growth in regions of East and Southeast Asia have been so much faster, and that the production and export potential of high-producing regions in Latin America has tended to dominate the global dynamics of agricultural markets and trade.

These reasons notwithstanding, there is still some useful information that can be had from existing forward-looking studies of African agriculture, despite its relatively crude and cursory treatment. In the following sections of the paper – we point to such studies and describe their key messages and shortcomings, so as to illustrate and motivate the need for improved foresight studies for the African region. In 2012, the Global Forum for Agricultural Research (GFAR) carried out an inventory of foresight for African agriculture and found that there was very little to be found for Africa (Bourgeois 2012). The details of that inventory are in Appendix 3.

The annual World Agricultural Supply and Demand Estimates (WASDE) published by the United States Department of Agriculture (USDA 2012a), is a shorter-term assessment that provides a comprehensive forecast of supply and demand for major U.S. and global crops and U.S. livestock. Providing a framework for related USDA reports, it is the product of data gathered from a number of statistical reports published by the USDA and other government agencies. While it briefly touches on impacts and projections involving the African region and one or two African countries, it also does not delve into more useful specifics. Primarily it states that global sorghum production is 0.7 million tons higher for 2012/13 with small increases for Australia, the United States, and several African countries, and corn and sorghum food use is higher in the same period for several African countries where these grains remain a staple food. Ending stock forecasts are however not made for the African region. Similar to the OECD- FAO global outlook (OECD-FAO 2012), USDA also shows an increase in global rice consumption of 0.9 million tons to a record 468.6 million, with most of the increase in China, India, and Nigeria, partially offset by decreases for Bangladesh, Egypt, and Tanzania. The assessment forecasts a reduction in ending stocks for Bangladesh and India but an increase for Nigeria. Wheat and soybean and corn ending stocks and are only detailed for North and South Africa respectively with projections for other African nations reported as a group labeled as the Southern Hemisphere or 'African Fr. Zone' with no country detail (USDA, 2012b). FAPRI



is even less detailed short-term assessment that makes broad generalizations with regards to agricultural commodity production and consumption projections in Africa (FAPRI-ISU 2011).

Only one of the underlying assumptions and one trend projection in the OECD-FAO medium-term assessment is related to movement in African agricultural markets. The first is the assumption that growth in developing countries should increase the potential for south-south agricultural trade. This is attributed to the fact that income growth is closely related to population growth which is highest in regions like Africa (around 4% on average), and demand for higher-value agricultural commodities such as meat and dairy is more responsive to the rising incomes in these emerging economies than in mature markets. Therefore high growth developing countries, such as those in Africa, will lead most of the growth in imports of both processed and bulk agricultural commodities. The second is the commodity market trend projection that rice production is set to expand due to rice cultivation promotion policies which are targeted at supporting farmer incomes and limiting rural migration, and national and regional efforts to improve food self-sufficiency. Regardless of increased production and consumption the largest production gains are projected to come from major rice producers such as India, Indonesia, Thailand and Viet Nam (OECD-FAO, 2012).

The longer-term global assessments – i.e. MEA, UNEP-GEO (UNEP 2007) and IAASTD – do a slightly better job in terms of coverage of African agriculture but they are still lacking in sufficient detail with regards to future country level projections for African agriculture. The International Assessment of Agricultural Science and Technology for Development (IAASTD 2009) focuses more on the impacts of past, present and future agricultural knowledge, science and technology (AKST) on the fight to reduce hunger and poverty, the goal of improving livelihoods and human health and an equally applicable as well as socially, environmentally and economically sustainable formula for development. It is a global assessment but incorporates five sub-global assessments that focus specifically on North and sub-Saharan Africa, among other regions; therefore it contains some targeted regional analysis. It points out the great imbalance in numbers of AKST researchers per million inhabitants and that this number is 65 times smaller in Africa than in industrialized countries (IAASTD, 2009). The Millennium Ecosystem Assessment is also a global analysis which focuses primarily on the consequences of changes in the ecosystem on human livelihoods. It is a more scientific appraisal of movements within the world's ecosystem and provides a scientific basis for policy action targeted at its sustainable use and conservation. While the project includes sub global assessments, it only covers the South African region in its examination (MEA, 2005). FAO's "World Agriculture to 2015/2030" report (Bruinsma, 2003), examines global prospects for food and agriculture including fisheries and forestry over the years leading up until 2015 and onwards until 2030. It details the global, long-term prospects for trade and sustainable development and discusses the issues at stake in these areas during the period of study. Its coverage of the outlook for Africa begins with the assumption that the population of sub-Saharan Africa reached 780 million by 2010 and per capita income growth will be approximately 1.8 per cent by 2015. Like the first few studied covered above, the FAO also relates food consumption patterns to increasing population and incomes as well as changes in dietary preferences and further estimates that population in sub-Saharan Africa will continue to grow by 2.1 per cent causing every third person added to the world's population to be sub-Saharan African. This is projected to further increase to every second person by 2050. Also the study points out that it is only in sub-Saharan Africa,

where incomes are growing but at a very slow pace, that the number of those living in poverty is expected to rise from 240 million in 1990 to 345 million in 2015 with 2 out of 5 people in the region living in poverty (Bruinsma, 2003). An FAO global outlook to 2050 (FAO 2006) also has similar messages for Africa.

A summary of some of the major trends for Africa that are embodied in these longer-term studies are shown in Table 1 below.

**Table 1: Summary of messages from long-term assessments**

<p><b>Consumption patterns</b></p>	<ul style="list-style-type: none"> <li>• Coarse grains (maize, sorghum, millet, barley, oats, rye and regionally important grains like <i>tef</i>) continue to serve as important foods in SS Africa, while used mostly for animal feeds elsewhere – and projected to grow faster than rice or wheat in consumption</li> <li>• Cons of roots, tubers &amp; plantains in decline elsewhere except SS Africa. Avg demand projected to rise in developing countries – with sweet potato &amp; potato being important in animal feed</li> <li>• Per capita fish consumption may stagnate or decline in SS Africa (and NENA), with local wild stocks fully exploited and very little aquaculture</li> </ul>
<p><b>Land and resource use patterns</b></p>	<ul style="list-style-type: none"> <li>• Whereas yield improvements will account for 70% of production growth to 2030 (while land expansion is 20% and crop intensity changes are 10%) on a global level – SS Africa will rely more heavily on land expansion, with gradual shift to yield growth in future</li> <li>• More than 80% of arable area expansion is expected to occur in SS Africa and Latin America (North Africa, by contrast, has almost no area expansion)</li> <li>• Shares of irrigation remain small in SS Africa, in contrast to 14% increase in irrigation water withdrawals by 2030.</li> </ul>
<p><b>Production patterns</b></p>	<ul style="list-style-type: none"> <li>• Small scale farmers will continue to dominate the land scape for coming 20-30 yrs</li> <li>• The fastest growth rates for fertilizer consumption expected in SS Africa – though from very low level. Global consumption expected to grow at avg of 1% p.a. over next 3 decades.</li> </ul>
<p><b>Human well-being outcomes</b></p>	<ul style="list-style-type: none"> <li>• Average nutrition will fall slowly in SS Africa, with 15% of the population (183 million) remaining undernourished (only 11 million less than 1997-2000 levels)</li> <li>• By 2050 18 million of the 26 million added annual to world population will be in SS Africa</li> <li>• Climate change risk could depress cereal production by 2-3% by 2020/2030 and increase numbers at risk to hunger by 10 million</li> </ul>

These global assessments provide an essential backdrop for stakeholders across the agricultural landscape, and although we do get some useful insight on some of the forces shaping African agriculture from these long-term, global assessments – we often don't get sufficient resolution on the diverse regions of Africa. Therefore, there is a need to examine

assessments that are more specifically tailored to answering questions about what the driving forces are behind Africa's agricultural supply/demand dynamics

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## 6 Insights from an expert consultation

In October 2012, a small consultation was held to discuss the critical drivers of change in Africa agriculture, among a group of experts who engage in forward-looking assessments of agriculture within the Africa region. Among the main objectives of the meeting was to review the results from various forward-looking studies on African agriculture and to have a deeper discussion about their implications, the empirical underpinnings and the major gaps of knowledge that the address (or which still remain). We felt that it was important to identify the key areas of uncertainty that touch upon the most important drivers of change within the Africa agricultural sector, as those would be the most important determinants of future market evolution

The consultation was an extremely useful way of bringing together regional experts to compare notes on important trends within their respective regions, and to obtain insights from the works of their peers in how they tackle common issues of empirical analysis. We were able to identify some common challenges of methodology and data quality (and availability). Some important themes that tied together the work of the group were identified, and can be summarized as follows.

An important insight from the consultation was that the internal demand dynamics are extremely important for understanding the evolution of African agriculture and food systems in the medium- to long-term horizon. Given the steady rates of growth in population, income and levels of urbanization – the consumers of Africa are exerting a steady influence on how value chains are developing within the continent. From both the West and Southern African regions, especially, where there are large and fast-growing countries – the advent of supermarkets, fast-food chains and growth in value-added industries of agriculture points to the changing landscape of the food systems. The group identified some weaknesses in how these influences are captured in data and modelled, as an important area for research improvement.

A common theme across many of the presentations was that of growing environmental pressures from changing climate conditions, which will affect the production potential of key staple crops in many regions of Africa, and create more demand for improved infrastructure, in the form of irrigation, storage and even roads – which are likely to be hard-hit by heat, floods and other weather-related stresses. The uncertainty in the results from various global climate models make the quantification of regional impacts challenging – and there still exists a serious gap in the way that extreme weather events are modelled. But the expert group agreed that there is a body of evidence that already points to some likely impacts, and these should be supported further by more quantitative research. The gap in how livestock is addressed in these studies, was also cited as a serious limitation that should be addressed in future analysis.

Another important insight which was raised, within the context of Africa's overall growth picture, is the fact that a lot of the important driving forces that can contribute towards the transformation of the African agricultural sector, in future, will need to come from outside agriculture itself. The fact that growing domestic demand for agricultural products – and the processed goods that come from it – tend to be driven largely by the socio-economic development of countries, points to the importance of maintaining the momentum of economy-wide growth that is necessary for achieving the goals of the Comprehensive African Agricultural Development Program (CAADP) as well as for the Millennium Development Goals (MDGs).

In the course of discussing the various approaches that could be used to characterize the future growth of African agriculture, we also identified some promising ways to better embed foresight into the quantitative work that is usually done. The examples provided by the regional assessments of Southern Africa (done by BFAP) or the consultation-driven regional storylines that were generated for African agriculture within the MEA, the GEO-4 assessments and the IAASTD study – all demonstrate how quantitative and qualitative elements of foresight could be combined in an effective and useful way. Although it can be costly to include an elaborate consultative process with every forward-looking study, the previous studies that articulated the medium- to long-term drivers of change in African agriculture could be drawn upon for information that can be built into the quantitative assessments that market and policy analysts.

At the conclusion of the consultation, we had a number of interesting messages that could be distilled for discussion at the November 2012 conference to launch the Australian International Food Security Center (AIFSC), as well as for the discussion of foresight that were going to take place at the second Global Conference on Agricultural Research for Development (GCARD II) in October 2012, within the side-meetings on foresight that were to be held there.

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## 7 Key drivers of change for African agriculture

In this section we synthesize the most important drivers of change for African agriculture, that were identified and discussed in the expert consultation. They each represent an important aspect of change that will exert a 'pull' or 'push' pressure on African food systems --- either from the demand or the supply side.

### ***Urbanization***

One of the themes which came out very strongly, during this consultation, was that of urbanization and its implications for food demand in sub-Saharan Africa, and overall socio-economic change. The expert analysis of West Africa, in particular, drew attention to this trend of urbanization, as being one of the main features that's shaping the landscape of agriculture in that region. Although it is sometimes problematic to get a consistent definition of urban and non-urban areas within Africa, sources such as AFRIPOP have made an effort to do some harmonization of information, so that a better view of what's happening in the sub-continent can be obtained. The importance of urbanization is also echoed in the discussion of urban growth and its relation to agriculture, in the recent evaluation of African infrastructure by the World Bank and the African Development Bank (Foster and Briceño-Germendia, 2010). In this study, they point out that the growth of urban centers provides a strong pull from the rural areas that are close to it – termed the 'rural hinterland', by then. They note that almost 85% of Africa's agricultural production comes from this 'rural hinterland' – comprising regions within 50km of an urban center – and points to a close connection between patterns of socio-economic change and the demand for agricultural products from the rural sector.

### ***Agribusiness***

Another important driving force in African agriculture, is that of agribusiness investments, and the growing commercialization and value-addition occurring in retail chains all over the African continent. The expert assessments from Southern Africa, in particular, showed the steadily increasing influence of large agribusiness concerns, and the effects that they have on the mix of agricultural crops that are grown in the region, and the levels of productivity and quality that are demanded from suppliers by large agribusiness operations. In other parts of sub-Saharan Africa, the influence of agribusiness-driven concerns is felt mostly through the interest that outside investors have to obtain land and resources to set up large-scale commercial farming enterprises, that focus on particular crops of interest – such as biofuel feedstock crops, or high-value products that can earn high export revenue. Some of the concerns surrounding large-scale land-acquisitions (termed 'land-grabbing' by some in the literature), come from observations of how these outside agribusiness-oriented enterprises have gone about obtaining long-term concessions of land from national and local governments, often without the unanimous consent or prior knowledge of local residents. A great deal of work is being done to look into the actual extent of these type of land acquisitions, so as to better understand the

origins of the investment purposes, and to determine how much of them constitute real acquisitions, as opposed to investor intentions which have been announced through local or international media.

Within the consultation, there was recognition that more needs to be done to strengthen governance of land (among other institutions) within sub-Saharan Africa, to prevent the loss of resource access by vulnerable people in regions with high investor interest. At the same time, the potential role of agribusiness in boosting the productivity and profitability of the farming sector – either through enhanced retail volume, greater value-added or the beneficial transference of technology, inputs and resources to farmers -- was recognized, and was deemed to be an important dimensions of African agricultural growth in the future.

### ***Climate Change***

Within the consultation, a number of experts pointed to the influence and impact that future climate change (and increases in current levels of climate variability) would have on the future of African agriculture. Given the relatively low levels of irrigation investment in many regions, the ability to buffer changes in rainfall levels is relatively limited, and exposes farmers to a high degree of vulnerability. For some regions, the threats of future climate change are manifest in potential decreases of rainfall and increases in temperature. For other regions, the main threat that climate change poses is that of increased frequency of dry weather events – regardless of what the overall seasonal average of precipitation might be. In wetter regions, the possibilities for increasingly strong flood events poses a large threat to agriculture (and other sectors), especially where the infrastructure and capacity to store and control flows of surface water are limited. For this reason, the infrastructure report of Foster and Briceño-Germendia (2010) points to investments in dams and reservoirs as being necessary not only for power generation, but also to manage the flow and volume of surface waters that are expected to be more variable in their streamflow over the coming decades.

Besides these drivers, it was also noted that the rapid penetration of information and communications technology (ICT) is likely to deepen and bring spill-over benefits to agriculture. The infrastructure analysis of Foster and Briceño-Germendia (2010) also pointed to the relative success of ICT in terms of its adoption in Africa, relative to other types of technologies, and that the remarkable rates of usage, even across the poorest types of households. Now that farmers are able to contact trading partners and associates in far-off places, in order to verify the levels and movements of prices, they are better able to avoid middle men and additional transactions costs in sale, and to exploit arbitrage opportunities. This is likely to lead to more integrated markets, and greater benefits for producers, as they are able to capture more of the final value of their goods.

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## 8 Key areas of uncertainty in African futures

While there have been medium- to long-term studies (MEA, GEO-4, IAASTD, FAO projections, etc) that have helped to illuminate some of the broad trends that will shape the patterns of agricultural production, consumption and trade across Africa – there are still a number of important areas of uncertainty about Africa’s agricultural future. While we are broadly aware that socio-economic change – in the form of population and income growth – will have important implications for future consumption patterns in Africa, the role that the dynamics of urbanization plays remains somewhat unclear. Much of the migration towards cities, in Africa, results in the accumulation of low-paid workers living on the urban fringe, who are clearly not as likely to contribute towards the growth in consumption necessary for creating backward linkages and boosting agricultural productivity in the rural sector.

The increase of commercial investment interests in Africa also poses an opportunity for growth within the agricultural sector, given that many of these investor interests originate from outside Africa and are focused on producing agricultural products for export. These commercial ventures have raised concerns over the way in which land concessions were made, and have been closely studied by those who wish to understand the implications of these large-scale acquisitions – termed ‘land grabs’ by some – for local smallholders (Deininger and Byerlee, 2011; Deininger *et al*, 2011). Some have argued that the attempt to create ‘super farms’ in Africa, on the basis of these types of outside-driven agricultural investments are not as beneficial as other types of investments and interventions that can boost the on-farm productivity in Africa and create a more organic process of farm consolidation and production intensification (Collier and Dercon, 2009). Some of these commercial interests are more ‘home-grown’, however, and constitute an increasing level of vertical integration that is occurring in the more advanced agricultural economies of Africa with growing agribusiness operations, such as Southern Africa (BFAP, 2012). The extent to which these kind of agribusiness-oriented investments and transformations of the food value chain will spread across the various regions of Africa, in future, is a point of uncertainty and intense research interest.

Many of the agricultural assessments that we have discussed deal mostly with Africa’s trade connections with the rest of the world – but have relatively little to say about the dynamics of intra-regional trade between African countries. The fact that many African countries are land-locked and face high costs of transaction and shipping, mean that they must rely upon their nearest neighbours for their supply of agricultural and non-agricultural goods. Many of the secondary statistics that are available for analysis do not adequately capture the quantities of intra-regional trade that occur in Africa – although individual studies have pointed to their significance, vis-à-vis international trade linkages (Binswanger-Mkhize *et al*, 2009). This remains, therefore, an often poorly understood dimension of African agricultural trade dynamics in forward-looking studies.



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## 9 Promising approaches to improving foresight

Here we describe some examples of where strong efforts are being made to understand the key drivers of agriculture for specific sub-regions of Africa, and to fill in the methodological gaps and points of uncertainty that were raised earlier. These examples highlight the kind of work that needs to be carried out at a broader scale to better understand the trends and drivers of African agriculture, and to help fill in some of the important knowledge gaps that still exist about Africa's agricultural future.

### *Foresight-guided projections: An example for South Africa*

Some examples of Africa-centered assessment of food and agriculture include the Baseline Agricultural Outlook conducted by the Bureau for Food and Agricultural Policy (BFAP, 2012), and the reports done for the ECOWAS region by the Sahel and West Africa Club affiliated with the OECD (SWAC-OECD 2012; Hitimana 2011a, 2011b, 2011c). These are focused studies on the future of food security in Africa some analysis at the regional and country level.

BFAP presents a projection of South African agricultural production, consumption, prices and trade from 2012 through 2021. Generated by the BFAP sector model, projections are based on a series of assumptions about economic, technological, environmental, political, institutional and social factors. These assumptions are, in turn, generated through a foresight-based approach, in which there is a visioning process involving key stakeholders within the region, that help to outline the broad trajectory over which some of the major drivers of trend might evolve. The baseline as constructed and utilized in the assessment is not intended to be a forecast but a glimpse of potential outcomes based on the assumptions that oil prices will stagnate or decline, global and SA economic growth rates will remain low, there will be a gradual depreciation in exchange rates, markets will experience high world agricultural commodity prices over the medium term with a declining trend in the long run, real gross income in SA within the agricultural sector will show strong growth in 2012 and 2013 but will decline in the long run, there will be increased field crop production despite stagnation in production areas due to increased intensification, there will be consistent intensification and expansion of meat, eggs and dairy however domestic production will likely not meet the growth rates of the past decades, and that horticultural production will remain stable over the study period with growing export parity due to dampened exchange rates (BFAP, 2012).

Some important messages which come out from this study, are summarized in Table 2 below.

**Table 2: Summary of messages from BFAP outlook for South Africa**

<b>Consumption patterns</b>	<ul style="list-style-type: none"> <li>• Consistent demand growth expected from population trends</li> <li>• Demand for potatoes and wheat-based products projected to growth by 18 and 20%, respectively, while that of maize meal remains stagnant</li> <li>• Demand for been expected to grow at annual rate of 3% p.a., following incr in real disposable income and livestock production</li> </ul>
<b>Resource use patterns</b>	<ul style="list-style-type: none"> <li>• Resource constraints will continue to heavily revolve around land and water availability</li> </ul>
<b>Production patterns</b>	<ul style="list-style-type: none"> <li>• Sources of increased production likely to come from intensification and not land expansion</li> </ul>
<b>Market environment</b>	<ul style="list-style-type: none"> <li>• Commodity market movements will be greatly influenced by linkages with energy markets</li> <li>• Slowed domestic and global economic growth will have significant impact on exchange rates – with SA rand remaining strong with very gradual depreciation</li> <li>• Uncertainty will persist over policy environment with market deregulation and changes in trade tariff regime</li> </ul>

Other sources of uncertainty surrounding the South African government’s biofuel policy, which whose industrial strategy was first published in December 2007. Given that the current level of biofuel production from agricultural commodities is negligible, it is likely that the government will introduce a mandatory blending rate of 2 % -- however there are no details on when and how this will be introduced.

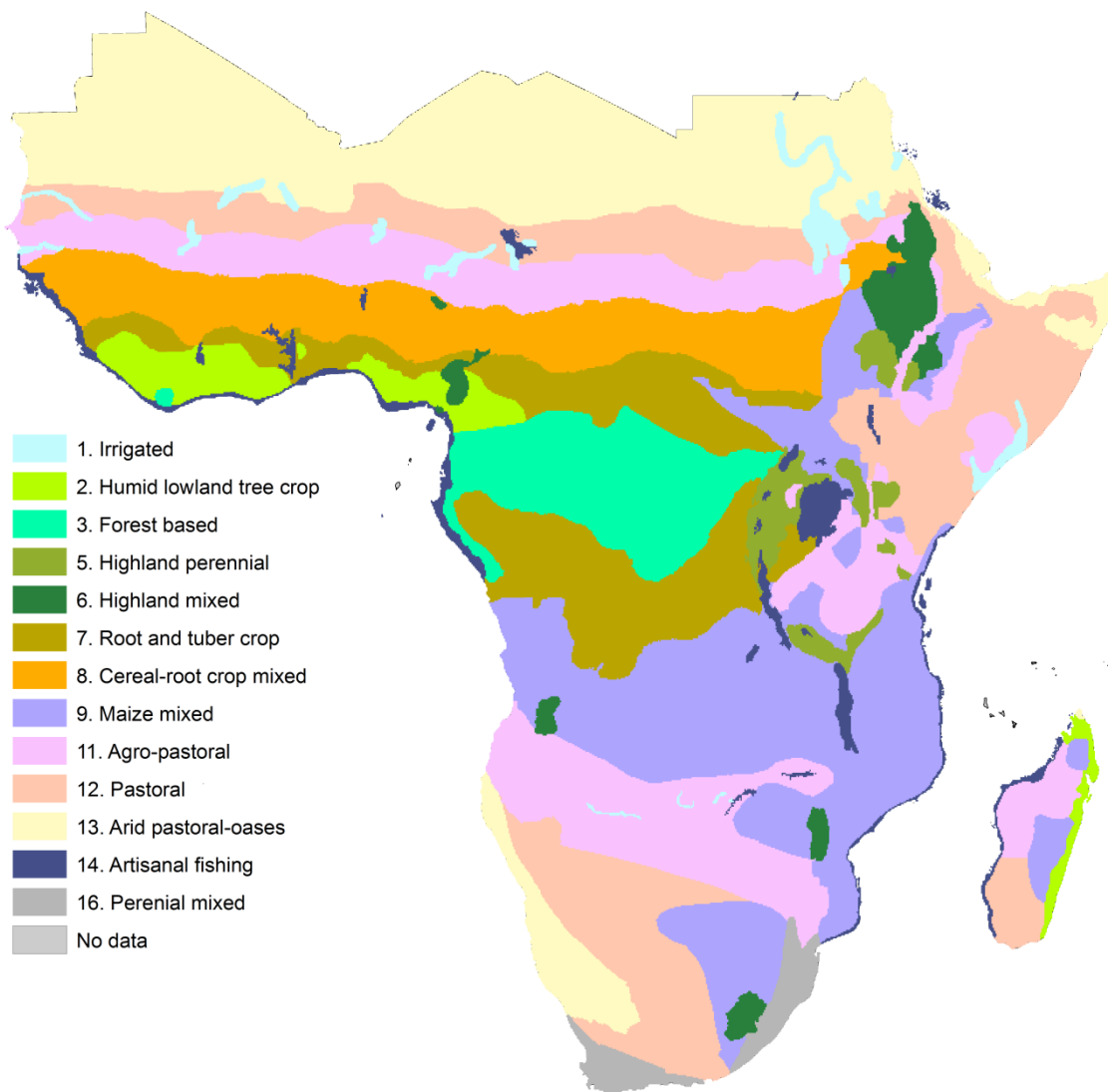
The example of modelling South Africa’s agricultural future within the BFAP framework helps to illustrate the importance of combining quantitative assessment of market dynamics and trends with a solid-understanding of relevant drivers of change, that can be informed by more qualitative, foresight-based evaluations done with the engagement of stakeholders and key informants. For a single-country analysis, where the relevant marketing boards, major producers and agribusiness concerns can be consulted – this could provide an extremely useful way of ‘ground-truthing’ the analysis and making the results more readily-usable and appealing to those stakeholders.

When trying to do an analysis across a broader region or group of countries – one may have to rely more on secondary sources of data, or on the understanding of market and agro-ecological constraints that come from a wider group of experts. This kind of information is embodied in the next examples that we shall discuss – where relevant information for understanding the constraints and future growth possibilities of African agriculture can be better understood by taking a closer look at the underlying characteristics of its farming systems.

### *Adopting a farming-systems perspective*

Many global economic assessments that include Africa tend to treat it as one big region – which usually arises from a poor understanding of the region or the lack of comprehensive (and good-quality) secondary data, which forces some to adopt a crude aggregation in order to ‘hide’ some of these statistical issues. A more nuanced and informed analysis of Africa, however, would see the continent as a collection of very diverse and heterogenous production (and consumption) units. A good example of this, in the domain of agricultural policy research, is that of farming systems – which offer a very rich characterization of the various types of crop-livestock-forestry configurations that are observed across Africa, and how they are conditioned by the terrain, climate, and the complex interactions within highly-varied agro-ecological zones. The work of Dixon et al (2001) was seminal in bringing this perspective to the understanding of agricultural potential and how it maps to socio-economic conditions and food security. There are now on-going efforts to update and expand the classifications of farming systems – as is embodied in the recent work of Garrity et al (2012).

**Figure 1: Characterization of Farming systems in Sub-Saharan Africa**



Source: GAEZ-FAO/IIASA, FAOSTAT, HarvestChoice & expert opinion (DRAFT)

Figure 1, above, shows the characterization of farming systems within sub-Saharan Africa as they are currently being revised, by a group of experts across various domains of crop, animal, soil and social sciences. The study of Garrity et al (2012) has been carried out in parallel to this foresight study, and has helped to enrich the thinking around how the characterization of future potential and the evolution of underlying drivers of change could be refined and further disaggregated across the relevant socio-economic and agro-ecological domains represented in the farming systems classification. It was not possible to fully implement a quantification of future market dynamics with respect to these farming systems, within the time frame of this project – although work is currently underway that will enable this link to be better integrated in future work.

The primary virtue of bringing a farming-systems perspective to the forward-looking analysis of agriculture, is that it allows the analyst (or group of analysts) to think more systematically about how localized drivers of change (or constraints to future change) are linked to the bio-physical environment, as well as to the prevailing agro-ecological and market conditions. In Table 3, below, we show how the potential for transformation within a broad characterization of farming systems was envisioned within the analysis of Garrity et al (2012, p 12).

**Table 3: Characterization of transformation potential within farming systems**

	Intensification	Diversification	Increased farm/herd size	Increased off-farm income	Exit from agriculture
Maize mixed	+++	+++	+	+++	+
Agro-pastoral	+	-	-	+/-	++
Highland perennial	-	++	-	++	+/-
Cereal root crop	+++	-	+++	-	+
Highland mixed	-	+	-	+	+

Adapted from Garrity et al (2012), p 12

The “+” symbols indicate the increasing potential for transformation and productivity improvement, with varying degrees of strength, while the “-“ symbols denote the limited potential for change (or the possibility of negative change) – that summarizes the discussion given by the authors in their description of future market transformation across various regions. This qualitative representation of positive and negative forces for change could be translated into a more quantitative representation of productivity growth or structural change that can be embedded within a modelling framework, and used to project how future trajectories of socio-economic and agricultural growth might look in these regions. While this has not been done in this study, it could be undertaken as an

exercise that engages a wider group of stakeholders in characterizing the strength and direction of system drivers in these regions.

Within the broader study of drivers of change within crop-livestock systems, that was carried out by the CGIAR systemwide livestock program (SLP) – there was a research component on the drivers of change in crop-livestock-energy farming systems (CLEFs) from biofuels and bioenergy growth (Dixon et al 2010). This research activity used the definition of a number of characteristic crop-livestock systems in various parts of the world that could provide biomass for bioenergy, as well as for livestock – such as: the maize-based CLEFs of Kenya, the Wheat-based CLEFs of Turkey, the Cassava-based CLEFs of Nigeria, the sugar cane-based CLEFs of Brazil and the Sorghum-based CLEFs of India. The experts that were working on various aspects of livestock, water and crop interactions across these regions took the implications of forward-looking, global and regional modelling scenarios (mostly from the IFPRI IMPACT model), in order to imagine how the various drivers of change that would come from a low- or high- rate of biofuels expansion in the OECD countries would play out across these different crop-livestock-energy systems. Much of the attention in this study focused on the income effects of higher crop and biomass prices, due to biofuel expansion, and the possible tradeoffs between removing residue from the land for use in 2<sup>nd</sup>-generation biofuel processes, versus making it available for livestock feed or to provide additional organic matter to soils. While these drivers were heavily focused around bioenergy-related scenarios of change – the way in which the implications of drivers were treated across the various crop-livestock systems is a very good example of how the rich source of information that is embedded within such a characterization of farming systems.

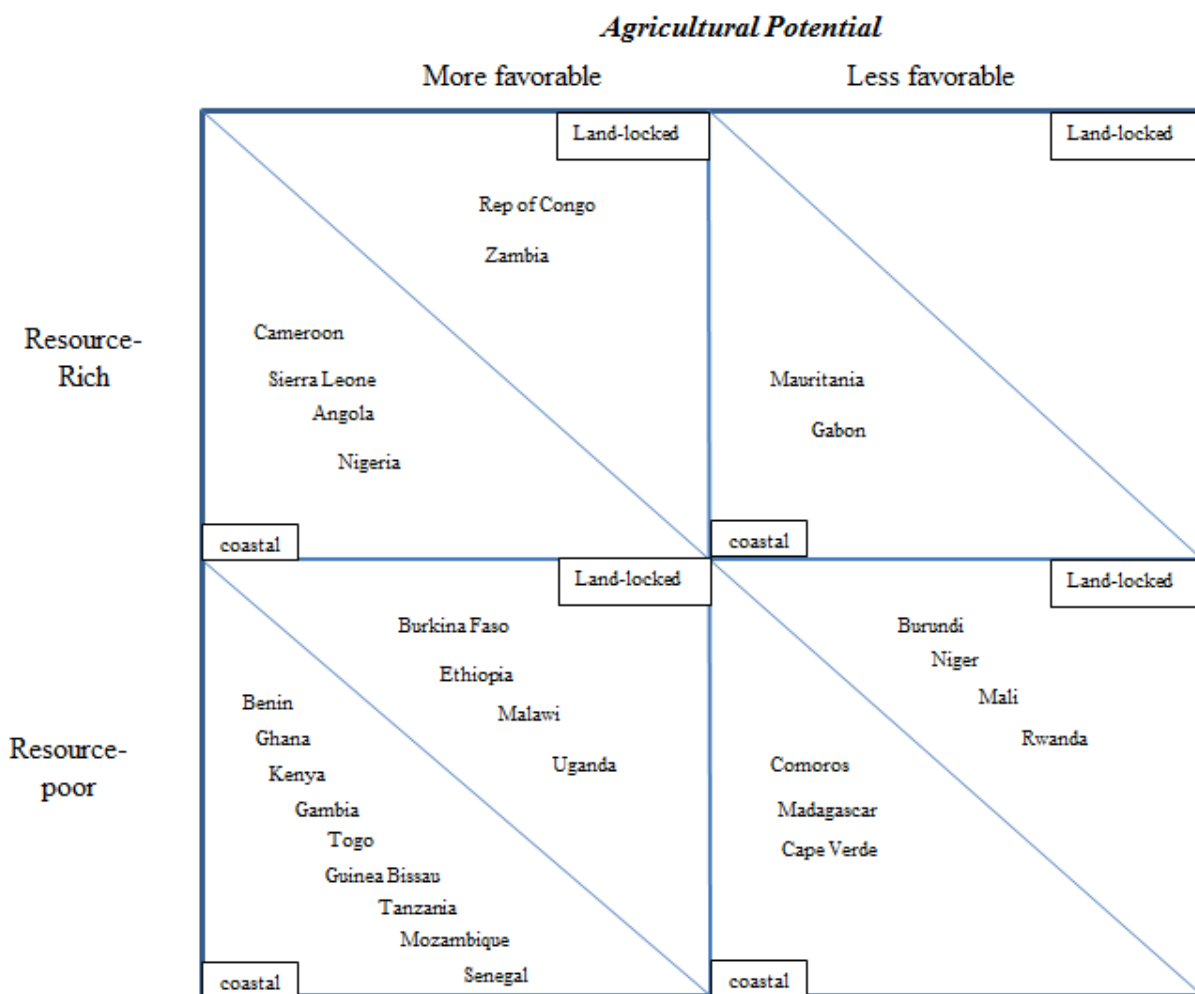
Although there are a number of useful dimensions that are embedded within the farming systems perspectives – there are other aspects of political economy and socio-economic characteristics that might be missing and highly relevant to the way in which drivers of change evolve in different parts of Africa. In this next sub-section, we discuss an example of a typology that tries to connect agricultural potential with other indicators of socio-economic relevance, in order to come up with a useful typology for understanding the dynamics of growth in Africa.

## *Some useful typologies for African Growth*

### *Typologies relevant to African Growth*

In this approach, we try to think more broadly about which kinds of African countries might be able to achieve economic growth and development goals more quickly or easily – and how this is related to a number of key characteristics. Thorbecke (2009) provides a useful typological classification of African countries, according to several key characteristics that are relevant to their growth potential – that of agro-ecological suitability and agricultural potential; the degree to which countries are ‘resource-rich’ or ‘resource-poor’; and, finally, whether the countries are land-locked or not. A summary of the classifications he proposes is given in Table 4, below.

**Table 4: Growth typologies of African Countries**



Southern Africa: South Africa, Namibia, Lesotho, Swazi, Botswana

Failed States: Somalia, Sudan, Zimbabwe, Chad

In addition to grouping countries according to those 3 basic criteria, he also groups two sets of countries in their own type of categorization. The first, consists of those countries in Southern Africa, which are in close proximity to (and including) South Africa – due to their particular history of development and the special characteristics and potential for growth that they share, as a result of their geographical and historical proximity to such a large, advanced and vibrant economy. The other category of countries that he keeps separate from his more general typological classification is that of ‘failed states, for which he feels no meaningful set of policies is relevant or able to affect growth, without addressing some of the very basic questions of governance and restoring rule of law and civil order. Since the time that he created this typology, some countries identified as ‘failed states’ might have graduated (or have begun to merit re-classification) such as Zimbabwe – whereas others might be on the verge of falling into a similar category. While we could try to re-think or re-create this classification, for now we can merely use it as a convenient framework within to organize our thinking of how drivers of growth in agriculture might evolve differently across the African continent. While doing that, we remain cognizant of some shortcomings of the typology – such as the fact that it is mainly restricted to Sub-Saharan Africa, and leaves out the North African region.

The countries that fall into the category of land-locked countries face a special set of challenges in terms of maintaining access to world markets and keeping open channels of communication and commerce. The infrastructure diagnostic for Africa (AICD) noted, in particular, that the key challenge of maintaining the competitiveness of land-locked African regions on world markets is in maintaining their infrastructure – as well as that of the neighbouring countries on which they depend (Foster and Briceño-Garmendia 2010). The countries that fall into the category of ‘resource-poor’, in which case they don’t necessarily have the challenges of political economy that arise when rents from fossil- and mineral-based resources are captured by the elite to exert influence and leverage – but have a different set of challenges in meeting their national development goals. The efforts at re-greening are particularly important in maintaining the resilience of the natural resource base in these countries, given that they lack the bounty of other exploitable resources that more resource-rich countries can fall back on as sources of national revenue.

South Africa, which was put into its own category by Thorbecke’s typology could otherwise be classified as coastal, resource-rich and having a favorable environment for agriculture. The fact that a great deal of economic value-added also occurs within the South African economy – as opposed to just exporting its raw resources and minerals, like other resource-rich countries do – is also a good example of how best to create jobs that provide decent work to laborers beyond just that which is available in the mineral and resource sectors, which tend to have limited employment prospects and impacts on the wider economy.

To summarize – we see that the greatest challenges to attaining sustainable agricultural growth to these various categories of countries lies in the following areas:

- (1) That resource-rich countries will tend to face issues of political economy around resource rents – which leads to capture, poor management and investment, limited society-wide benefits, and unsustainable and environmentally-harmful rates of resource extraction. These will tend to worsen with openness to trade
- (2) That countries with favorable agricultural potential but which practice poor methods of agricultural production might tend to degrade their potential more quickly when exposed to market incentives to grow more of their product, and gradually lose their competitiveness on world agricultural markets over time. An example of cotton in Burkina Faso can show how conscientious reforms could be made in the cotton sector to revitalize growth, restore incentives and establish strong farmer associations that can disseminate improved technologies and knowledge of improved cultivation practices (Kaminski et al, 2009). This could also apply to the coffee markets of Ethiopia and Uganda, or to other cash-crop (or even food crop) sectors of other countries in the categories of ‘more favorable’ agricultural potential, and which are opened up to global markets and trade.
- (3) Land-locked countries face challenges in maintaining competitiveness on global markets, due to the higher transportation costs that they must face. Therefore improvements in infrastructure which can lower these costs – as well as improve energy efficiency and reduce the generation of emissions from transport (e.g. by using rail instead of road) – can contribute towards the greening of the economy. Since all populations in those countries would face the same high transportation costs – any benefits that come from lowering those transactions costs with markets would be inclusive of all sectors of the population.
- (4) The failures in governance that plague many countries (including those under the ‘failed state’ category that Thorbecke proposed) work directly against the ability to achieve sustainable agricultural growth.

While we cannot provide an exhaustive account of the universe of policy interventions and institutional concerns that face all African countries, we have synthesized a set of insights that can apply to a broad typology of countries and the challenges they face to reach a sustainable future for their agriculturally-based economies and environment.

## *Synthesis*

Based on these various approaches that we've discussed, we can now try and reflect on what insight can be gained from them. The example from South Africa showed that there is great value in making use of qualitative 'stories' to inform the design of scenarios that can be illustrated with model-based, quantitative methods. The study of BFAP (2012) combines these qualitative and quantitative elements in a way that is similar to how the global environmental assessments like the Millenium Ecosystem Assessment (MEA 2005) and the UNEP Global Environmental Outlook (UNEP 2007) were done. The global assessments had a more elaborate modelling structure, and pulled in the input of a much wider array of scientists, specialists and stakeholders – but did not have as rich a perspective on the particular dynamics within African markets that the country study of BFAP was able to do. There could be great value to scaling up the BFAP approach to a wider group of countries within Africa, and bringing in additional stakeholders and experts to develop the qualitative elements that could be used to quantify the trajectory of important drivers of change.

The example of farming systems illustrates that there is a great deal of value in making use of the bio-physical understanding that we have of the African agricultural landscape, and the characterization of the vastly heterogeneous character of various farming systems. This helps to inform the analyst of the key characteristics and interacts to focus on (crop vis-à-vis livestock or forest, etc) and the constraints to change that are embedded in those systems. It might also be useful, however, to combine this with a broader typology that can also take into account the socio-economic and even political-economic dimensions of the African landscape, which might be highly relevant to agriculture and its potential for growth. This can only help, in our opinion, to further refine the conceptualization and quantification of important drivers of change that would be needed for forward-looking analysis, and improve the insights that are gained. The 'land-locked' aspect of the Thorbecke's proposed typology, in particular, is particularly important for the marketing potential of African agriculture, and is one of the key features that makes the improvement of infrastructure in Africa so important. It is one of the few continents that contains such a high proportion of countries that are completely land-locked, and this fact makes the coordination of regional bodies (ECOWAS, COMESA, SADC, etc) so critically important to allowing the market access of land-locked agricultural economies to the rest of the world. This is a particularly interesting aspect – that of political regional cooperation (or lack of it) – that could be explored further in scenario work.

All of these approaches present an productive and useful way in which to engage with stakeholders and experts in the region, and to focus discussion and thinking about agricultural futures in the light of the various constraints (and opportunities) that are present across highly-varied landscapes – and which can ultimately lead to better foresight for African agriculture. These approaches also provide a way of permanently breaking the notion of Africa as one, large, homogenous region – in the way that it is often modelled in multi-regional or global models. Whereas some analysts feel there is relatively little (or poor) data with which to characterize Africa's intrinsic heterogeneity – these examples show ways in which both physical and socio-economic data and information can be leveraged in a very fruitful way.



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## 10 Major lessons learned in the project

In the course of this project, we discovered some important aspects of building better foresight for African agriculture that we found to be valuable in setting priorities for future research and foresight activities. The first lesson was that improving foresight for African agriculture requires combining elements of qualitative visioning with quantification of drivers, supply & demand responses, market feedbacks and well-being impacts. The examples we've seen carried out in Southern Africa by the BFAP research teams shows that blending a rigorous analysis of market dynamics with scenario-based explorations of key points of uncertainty can yield a great deal of useful information

Another important lesson that we have learned in this project has been that typologies can be useful – both in terms of describing biophysical characteristics that define production potential and resource availability as well as key socio-economic features that describe how demographic and political-economic features of the landscape shape market access and wider economic growth potential. While there are a number of useful typologies available for looking at growth potential, there still needs to be more work done on combining important elements from different domains (socio-economic, geographic, environmental) to generate a more complete picture. Many of these typologies are also fairly static in nature, since they are generated on the basis of data drawn from a particular point in time. While some features of the landscape may not change over time, the socio-economic characteristics would most certainly shift in the future, as populations expand and market-access changes. Therefore, a more dynamic way of changing the boundaries of these typologies might be useful for improving foresight for agriculture, as it may give rise to a significantly different picture of where agricultural potential will be situation on the landscape, in the medium- to long-term horizons.

During the course of this project we have also confronted the challenge of data quality and availability that is typically encountered when doing empirical analysis of African agriculture and the wider economy. There has been a great deal of effort put into improving the quality of secondary bio-physical data (through efforts of groups like *HarvestChoice*, the soil maps for Africa, land cover databases) – but not as much on the economic side, which is needed for parameterizing the responses of market supply and demand drivers and the distribution of different producers and consumers across the landscape. In time, better use can be made of household-level information so that it can be used to characterize producer and consumer response in more macro-scale models. Recognizing this – we have elected to impose more 'structure' on our modelling, where disaggregated data is not available, so that we achieve internal consistency within our overall analytic framework. An example of this is in how we use information on animal feed requirements to re-balance FAO data, to maintain consistency between the production and resource availabilities.

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## 11 Conclusions and recommendations

Now we can summarize the various insights that we have gained In the course of carrying out this project, during which we undertook a literature review and an expert consultation on foresight for African agriculture – and even did some of our own quantitative work. We think that these carry some important messages and recommendations for ACIAR and for how it (and the various clients that it works with in Africa) might want to make use of ag-focused foresight studies.

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### 11.1 Conclusions

An important finding from our study was that quantitative projections of agricultural futures can be greatly enhanced with the use of foresight approaches which apply both qualitative and quantitative approaches to describing how the major drivers of change are likely to evolve over time. The application of foresight is most useful, in fact, when it is used to illustrate the range of uncertainties that may exist over a number of those key drivers – and allows the analyst(s) to explore the implications of variations across the range of outcomes that can evolve over time. This approach has been useful in drawing out the different ‘storylines’ that were used to illustrate the alternative futures explored within the MEA, GEO and IAASTD studies on a global scale – and which were also applied to the Africa region. In our opinion, more work should be done to focus on the particular aspects of Africa’s development pathway that are unique and challenging, so that the influence of the most important drivers can be explored over a range of possible outcomes. This would likely require its own type of foresight effort – in which the various sub-regions of Africa could be explored in detail.

It is precisely this level of sub-continental detail that is often missing from forward-looking assessments of African agriculture. Within the larger global studies, Africa is often treated as a single region, with little effort given to draw out the sub-continental variation in conditions and driving forces. The expert consultation that we carried out for this project was meant to draw out some of the major differences across Africa, so that a clear focus could be brought upon the particular forces of change that are important in each region. Our consultation was relatively short, and could not bring out all of the key facets that characterize the agricultural future of each sub-region of Africa – but helped to illustrate, nonetheless, that there is a sufficient range of issues that could be explored in more detail, in future studies.

We also explored the way in which sub-continental typologies of biophysical and socio-economic characteristics can be useful in illustrating the potential pathways of change for the important drivers of African agriculture. The farming systems perspective brings the particular agro-ecological characteristics of each sub-region in Africa into a clearer focus, and shows how the nature of crop-livestock-forest interactions vary across the continent to form a highly varied landscape of agricultural productivity and potential. This type of characterization is particularly useful when carrying out quantitative assessments of crop yield potential, which require a particularly rich characterization of biophysical characteristics in order to be operationalized. There is a body of work that is underway to use the farming systems characterization to illustrate the growth potential of African agriculture, so that it can be combined with economic market models to give a more detailed view of how supply, demand and trade of agricultural products might evolve in

future. The inclusion of other types of growth typologies – like the one proposed by Thorbecke (2009) – might also help to understand the socio-economic drivers of change that will shape the future of African agriculture (and economy-wide growth) and could potentially be ‘overlaid’ with the Farming system-based typologies to give a more complete map of how the landscape of African agriculture could evolve, and which are the key points of intervention that technologies or policies could make. This is an area that warrants future research, and needs more interaction between the agricultural scientists and those who bring more of a political-economy perspective to the analysis of growth in Africa.

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## 11.2 Recommendations

Based on the analysis that we have done, and on an examination of the strategic priorities of the new Australia International Food Security Centre – we make a number of important recommendations that we feel will allow AIFSC, ACIAR and the wider body of stakeholders to both improve and benefit from the use of foresight and forward-looking assessments of agriculture for Africa.

Our first, and most important recommendation is that AIFSC adopt a priority-setting framework that can make use of foresight and forward-looking assessments in a systematic way, so as to challenge assumptions about future research needs and explore the implications of alternative allocations of resources to different research program areas. By being able to identify the key points of uncertainty around the key driving forces of change in different farming systems and regions of interest in Africa, the AIFSC can be able to isolate the most important questions that a scenario-based, forward-looking assessment needs to address, and use the results to gauge the ‘leverage’ that can be exerted by the centre’s efforts and the most promising entry-points for interventions.

Closely tied to this first recommendation is a second one – that the AIFSC establish some in-house capacity to make use of foresight-based studies from various sources, and to be able to distill the critical implications that relate to the areas of AIFSC’s research program. The in-house person (or team of people) might even commission new types of studies to be done which focus on particular aspects of future uncertainty that are worth exploring, given their importance to the programmatic goals of AIFSC. This internal capacity can also be used to mobilize stakeholders in Africa (and other regions, as well) around new research efforts aimed at improving the understanding of important trends and drivers of transformation, and how they relate to the physical and socio-economic environment of the target regions, as well as the interventions that might be possible and effective.

While these would consist of some long-term efforts – there are some short-term partnerships that could be formed to help the process along. ABARES and CSIRO might have some in-house expertise that can help in this (as well as other institutions of excellence within the Australian university system) – and there could be other groups in the Asia-Pacific region or elsewhere that might also be potential partners. Making stronger ties along these lines will provide very high rewards, and will help put AIFSC closer to the center of strategic thinking on agriculture, nutrition and food security within the region and the wider international development policy community.

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## 13 Appendixes

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### 13.1 Appendix 1: Agenda/Program for Expert Consultation

This is the Agenda and program for the expert consultation that was held in Pretoria, South Africa, and which provided direct input into this project

#### **Workshop on Foresight and Projection-based Assessments for African Agriculture**

**Pretoria, South Africa, 24-25 October 2012**  
**Conference Room, Umzoxolo Lodge, Hatfield**

#### **AGENDA**

##### Objectives:

- Review and discuss the results from various foresight exercises on African agriculture
- Identify key areas of uncertainty concerning important drivers of change in the African agriculture sector and related markets
- Identify important gaps in data and formulate strategies and priorities for obtaining them
- Synthesize some key messages emerging from various agricultural foresight messages coming from Africa and identify the implications for investments and policy change
- Discuss which messages to take forward to the upcoming AIFSC Conference
- Identify key messages for the GCARD II meeting and Foresight Expert group

#### **Day One (October 24)**

08:30-09:00	Arrival/Distribution of workshop material	
09:00-09:10	Welcome and workshop opening	<i>Siwa Msangi</i>
09:10-09:15	Introductions of participants	

#### ***Baseline projections for agricultural markets***

09:15-10:00	Baseline and scenario projections for SS Africa from IMPACT	<i>Siwa Msangi</i>
10:00-10:30	Africa Farming Systems in 20 years: Key forward-looking questions	<i>John Dixon [remotely]</i>

10:30-11:00 **Coffee break**

*Foresight for SADC countries*

11:00-11:45 Baseline results for Southern Africa from BFAP model  
*Ferdinand Meyer*

11:45-12:30 Key drivers of change in Southern African agriculture  
*Lulama Traub*

12:30-14:00 **Lunch break**

14:00-14:45 Priority investments for improving food security in Africa  
*Rhoda Mofya*

*Foresight for ECOWAS countries*

14:45-15:30 Food security, market opportunities and ag transformation in West Africa  
*Léonidas Hittimana*

15:30-16:00 **Coffee/Tea Break**

14:45-15:30 Agriculture growth and CAADP: Perspective from West Africa  
*Ismael Fofana*

15:30-16:00 Key drivers of change in East African Agriculture  
*Siwa Msangi*

*Synthesis discussion*

16:00-17:00 Discussion of participants relating to key themes

- Role of agribusiness as a driver of change
- Diet change and consumption patterns in Africa
- Future prospects for productivity change

**Wrap-Up and Summary for the day**

17:00-17:15 Wrap-up for the day, logistics and looking forward to tomorrow  
*Siwa Msangi*

**\*\* Adjourn \*\***

19:30 Reception/Dinner at local restaurant (TBD)



## Day Two (October 25)

08:45-09:00 Arrival of participants

### **Synthesis**

09:00-09:15 Re-cap of main messages from previous day  
*Siwa Msangi*

09:15-09:45 Overview of GFAR Foresight Platform  
*Siwa Msangi*

09:45-10:30 Foresight and drivers of change in African agriculture  
*Tanya Hichert*

10:30-11:30 Synthesizing key messages to take to AIFSC and GCARDII

- Farming patterns of the future in Africa
- Future consumption patterns in Africa
- Resource usage (land water)
- Sources of agricultural productivity growth in Africa – with emphasis on Eastern & Southern Africa
- What do we need from the GFAR 'African Foresight Academy'?

11:30-12:00 Synthesizing key messages to take to AIFSC and wider policy makers

- Opportunities for cooperation and partnership
- Opportunities and needs for investment
- Opportunities for (mutual) capacity-strengthening
- Collaboration on future foresight exercises

### **Wrap-up**

12:00-12:15 Wrap-up and summary + vote of thanks  
*Siwa Msangi*

**\*\* Workshop ends \*\***

## Participant List

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\*\* joining remotely

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## 13.2 Appendix 2: Discussion Notes from Expert Consultation

The following notes capture the discussion that took place during the two days of the expert consultation.

### **Foresight Workshop Day 1 [24 Oct]**

#### *Opening Remarks*

#### **Siwa Msangi (IFPRI)**

#### **Presentation Summary: Global Forum for Agricultural Research (GFAR)**

In an attempt to establish a dialogue on forward looking assessments for agriculture, the GFAR has sponsored workshops during which practitioners exchange ideas and research methodology, highlight key diversions and tensions in agricultural futures research and identify important research areas for the agricultural foresight research community.

GFAR has also undertaken a global survey of recent agricultural foresight studies and discovered that a number of efforts in this area are currently underway. However, some regions better represented than others with very little happening in sub-Saharan African compared to other regions such as LAC and Asia. The survey also highlighted issues of limited stakeholder involvement as well as some overriding tensions. The GFAR survey also highlighted some of the major drivers of change key among which are policies, urbanization, land acquisition and management, demand for non-food products, and future food consumption which is mostly affected by changing dietary patterns.

GFAR's main goal is to create a space that fosters dialogue and capacity building on ag-focused foresight by stimulating debate on methodology, connecting science with society, building stakeholder capacity in the area of foresight research by targeting young professionals and building their skills to work on high priority areas.

#### **Q & A/Comments:**

Q: Do you split population into various income levels? ...because that is where you can make distinctions on your income elasticities...?

A: No, we are trying to divide into urban and rural. It is hard to do this on a global level but easier on a country level.

Q: How do you capture the income?

A: It is a fixed projection of per capita income. You find that you have to change income elasticities to reflect changes in population.

Q: On irrigation and natural resources, what database do you use?

A: There is hydrological model that underlies these results, and which determines the level of water availability that the market equilibrium model responds to. It uses a variety of databases, the most important of which is the historical data from the Univ of East Anglia (CRU2). What our water resource specialist does is to take the information that comes from a database like this, and calculate the water balance at the grid-level. So he uses the precipitation level and calculates the water balance for a particular area based on soil quality (which determines how much water is held in the soil profile), the deep percolation, how much is lost as evapotranspiration to the atmosphere – based on the type of vegetative cover, and (finally) how much is available as run-off – which is the water that's left available for human use. This includes household and industrial use – and

whatever is left over is the amount that's available for agriculture (livestock and crops). So agriculture becomes the residual claimant.

Q: Is satellite data available for irrigated areas? IMWI uses a remote sensing approach. We have our own method of accounting for irrigated and rainfed cropping, within IFPRI, that draws upon a number of different data sources (AquaSTAT of FAO, the database of Döll/Siebert at Univ of Frankfurt). IFPRI irrigated/rain fed crop maps are also freely available on our website (which I can point you to).

Comment: IIAASA also has a database (Global AgroEcological Zones – GAEZ). It was a joint process where they set up a database where they have irrigated area and irrigated yields according to different parameters. It is the most reliable global database in terms of land use.

Comments:

- There are many ways of looking at the issue because some of the studies have shown that yield is likely to increase in areas where there is access to markets as opposed to just irrigation related issues. [Siwa: Yes – we do have own-price elasticities for yield, that allow positive response to higher prices. Many models do this]
- IFPRI has done work in the past that classified the agro-economic potential of regions based on proximity to roads and populations. These were named “Development Domains”, and were based on a fixed point in time – although you can imagine these shifting endogenously as markets evolve and population and infrastructure adjusts....
- The World Bank did a diagnostic on infrastructure that revealed that about 60% of Africa's food is grown within the “urban hinterland” (which is roughly a 50 km radius around a particular urban center). This concept is somewhat analogous to the “food sheds” that some MSU researchers have tried to map in Africa. We don't capture this very well, but given the rate at which urbanization is happening this may be something we need to look more into.

Q: Do you know if ILRI has an IMPACT model? Because modeling livestock itself is a heavy task, sometimes there is a tradeoff on whether to have 2 different models as opposed to everything in one model, so if ILRI has something already, how can we team up to have one interface for the 2 models in order to have this feedback effect...

A: They have a bio-physical model called the RUMINANT model. We have tried to derive yield functions from it...what yields can be derived from certain diets etc. But the challenge is there are various feeding regimes, so we have to derive a function that is specific to each particular one. There are some models that run these kinds of biophysical calculations in real time and at grid-scale, but they sacrifice detail in other ways, because of the huge computational cost. But we have been trying to work with this type of information in a reduced form, so that we can keep the computational burden manageable.

Comment:

- Sometimes when discussing rural v urban, we think we have to pay special attention because this is true in countries where urbanization rate and GDP is low, but as urbanization grows, there is trend of having more non-agric activities in rural areas. So we concluded that when we want to define how things

Q: Who drives GFAR?

A: the secretariat of GFAR is hosted by FAO, and it has regional components – like FARA (for Africa) and APAARI (for Asia & Pacific region).

Comment: Requesting feedback on status of Africa Foresight Academy after Uruguay conference. There is currently an inventory of futures and foresight work already being done on the future of Africa and foresight work. ([www.foresightfordevelopment.org](http://www.foresightfordevelopment.org))

### **John Dixon ACIAR)**

#### **Presentation Summary**

**ACIAR focuses** on regional coordination for African and South and West Asia and manages projects related to cropping systems in economics as well as this study related to African agric foresight. John Dixon himself worked for a few years as director for impact and marketing and worked as well with FAO before that in all regions.

In addition to an overview of ACIAR, the discussion centered on the question of how to address the other parts of the economy that interact with and support the agricultural sector. Interaction with the minerals and mining sector was identified as critical, especially in relation with oil and gas. These activities create effects on the labor market that have impacts on agriculture such as increased competition for land. The informal sector was also identified as very dynamic and was highlighted as key especially in the urban settings.

#### **Q & A/Comments:**

Q: On the “*pathways of farm households out of poverty and food insecurity slide*” ...what is the source of the graphic?

A: the Farming systems and Poverty Book – WB/FAO @ [www.fao.org/farmingsystems](http://www.fao.org/farmingsystems)

Q: What was meant by diversification? Various farming system enterprises i.e. crop and livestock mix etc...?

A: we have used intensification in the natural sense, i.e. intensification of the natural pattern of production. Typically increasing productivity. Diversification involves significantly changing the pattern of production mostly by introducing new crops or trees, or significantly tipping the existing pattern from food to cash crop production etc.

Q: With the work you are doing in SA and the farmers you are looking at did the value chain integration techniques work?

A: Yes they did. We found that as we tried to find ways to increase farm prices of meat, there was more incentive for emerging farmers to improve feeding, husbandry, pasture management, vet services and genetics techniques. We did some studies that showed that indigenous breeds if managed well attracted equal prices and were as well regarded as cross or European breeds. The IRINI group has done some work on this, and the ideas developed in SA have been reintroduced in AUS and NZ. We are also taking it out to Botswana.

Q: I have not seen any reference to other parts of the economy because the non ag sector also impacts ag growth and food sec especially on the dd side...so what about the other factors that may have an impact on ag?

A: See key question 2 slide. The second question about effective demand should be broadened...do you agree?

Comment: we can be more specific when we refer to minerals and mining activities, also land use, intensification etc. will drive demand a lot.

A: I agree. It could be a game changer in a number of African countries. Many countries have extractive industry potential perhaps ½ or 2/3 so this is an interesting question so things like labor, mining which provides employment. So the question should be to what degree we can foster policy discussion that will include infrastructure.

Q: There is a political/policy issue to recognizing the informal sector of the economy...but it is not a much recognized area and it would be key for the coming decades in food

security because if you look at the trends, a large proportion of the population may be working in the informal sector of the economy. So I think that this is area that may need more attention because it addresses the issue of effective demand.

A: There is illegal informal work such as logging and forest product collection, but in the longer haul, I would have thought that informal jobs that would be created along value chains for value adding to agric products including all the way to street vendors, plus the growing numbers of peri-urban and urban households producing food (as high as 35% of many African city populations) are engaged in some way in production of some sort of food, especially if you add all the other parts of informal value chains. So yes I fully agree with you and stats are not too good in this area but arguably this is a very responsive sub sector to ag opportunities, so we may see the small scale informal response much faster and the large scale formal come in with somewhat of a time lag...is this your hypothesis...?

Q: Yes, because the informal economy is also responding, many times more quickly and efficiently, to address different services and a large number of the population in cities or towns live on informal activities (not illegal). So the hypo is that the informal economy is very dynamic and transforms based on specific factors and is actually a market for the formal economy so should be an important consideration in the coming years.

A: I agree. What I would ask is to what degree is the informal sector is a reflection of our inefficient labor and capital markets? I.e. if they were more effective would we see better reactions from the formal rather than the informal sector? I will just leave that question open.

### **Ferdinand Meyer Presentation (BFAP)**

#### **Presentation Summary: Forward-looking assessments from BFAP**

Interesting points raised here centered on how scenarios are used to complement the modeling efforts and address the challenges of dealing with structural changes, how key information from global outlooks like FAPRI/OECD-FAO can be used to inform regional models, the role of subsidies on cons patterns, intra-regional trade, uncertainty resulting from oil prices, world prices and weather and importance of narrating a consistent story at the baseline.

#### **Q & A/Comments:**

Comment: one other important scenario that did not come from John is the politically-driven subsidy program to ag production. It is quite unpredictable but it is resurfacing, so we see a scenario that promotes ag production but effect on rural production is not as desired.

Q: Do you have a process for learning this system?

A: Yes. We have broken all econometric rules, if we learn out of the scenarios that relationships have changed, we go to the model, learn from this process and change the parameters. So we learn out of the uncertainties of the process by trying to build them back into the model.

Q; how do you include policy into the model?

A: We start off with policies as they are in the baseline, but this is very difficult to capture. We may have to think differently about the baseline, as the audience wants to see a lot of policy analysis.

Q: You have this medium-term projection of what the govt plans to do for the next 5-10 years...that should help...

A: Govts are not implementing what they say and that is the main problem with that.

Q: With the *SA long run area under production* graph, how does the weather impact?

A: We differentiate btw rainfall that affects area planted and yields. So we have a database for specific area where maize is planted and this variable drives area and yields. So Oct to Dec rainfall influences area and Dec to (??) rainfall influences yield.

Q: The *chicken meat graph*...what is observed and what is forecasted?

A: Up to 2011 is observed, and 2012-2021 is the forecasted value.

Q: is there a reason you did not include groundnuts?

A: It is a smaller industry in SA, we have to include it.

Q: when you talk about foresight and you have 4 scenarios, based on those 10 years with real data and projects can scenarios be narrowed to 2 or so. Because the projection exercise is to say what is going to happen. So to facilitate policy decisions, how do you see taking risks and reducing the number of scenarios.

A: I agree. As we improve information we select sometimes only 1 combination of plausible events. Scenarios are a very inelegant way of dealing with the future.

Comment: because I am just thinking of based on how decision makers may see things. They may want fewer as opposed to more options to contend with.

A: the storyline approach is nice in the sense that you can figure out that some scenarios have inconsistent stories and you can debunk scenarios based on the story line.

Comment: it is important to get the right people around the table the right combination of public and private sector.

- For policymakers, this may work because instead of giving him 1 number, you give him a plausible range of numbers doing a sensitivity analysis, you know the probability of where your projections will fall to a certain degree of error.

## **Lulama Presentation**

### **Presentation Summary - Drivers of Change in Southern Africa**

The presentation examined agribusiness as a key component of change. It emphasized the 6 main drivers of change; FDI (investment hotspots; EAC, Ghana, Nigeria), land acquisitions (uncertainty on land policy), urbanization, ICT (rapid penetration), biotech, and climate change. The presentation also highlighted the need for a flexible and dynamic policy framework, and the food safety issue.

### **Q & A/Comments:**

Comment: one of the areas to discuss on tomorrow is food safety and quality...

A: this is an important area so yes we should definitely talk about this.

Comment: the tremendous implications of rapid urbanization and high penetration rates of ICT are also a significant driver. So how can policy help to navigate these trends?

A: We should maintain a flexible and dynamic policy framework in the fact of an uncertain future. We should seek harmonization of the regulatory environment. Interventions should be system-wide. Policy interventions should be non-distorting

## **Rhonda Presentation**

### **Presentation Summary - Investment to Improve Food Security**

The discussion brought out key issues involving the identification of the food-insecure and ways to ensure better targeting. It also pointed to major driving forces on both the supply side (land crisis, stagnant productivity, climate chg, ag input & food mkting subsidies) and the demand side (volatile prices, urbanization, changing food preferences, food deficits). The discussion also highlighted important issues of smallholder commercialization (mkt

access), the need for foresight in the private sector, and the continued need to improve crop productivity.

**Q & A/Comments:**

Comment: In West Africa, the CAADP program has required each country to map out programs on where they want to spend money so now each govt has to earmark programs in which they want to invest. So there is a need for the government to know where there is a large multiplier effect that improves the overall health of the agric sector.

Q: If you are a CADDP signatory, do they stipulate how the money should be spent?

A: No. In fact in Zambia, govt has been known to say that CAADP is unnecessary because they spend over 10% of the budget on agriculture. But, in fact, this spending has only been going to the marketing boards, as opposed to priority areas for agricultural investments.

Q: Isn't the share of fertilizer a logical flow out of the size of the farm...i.e. the larger farmers will receive the larger share of the fertilizer.

A: That is the point...these poorer farmers cannot access the fertilizer due to the size of their plots, so the issue is these programs are not reaching the poor who really need the fertilizer.

Comment: we have to think more about commercialization of small scale farmers. If we are talking about the 3 bullets on the *Priority Area No 1* slide, I can say that the 10 hectare farm has a better chance of commercializing than the 1 hectare. Also you will have to have private investors invest in infrastructure for it to be sustainable over the long run. The government will not maintain it and it will be a one-off exercise.

Response: the first observation about the larger farms having more potential is correct. First we have to ask if there is a possibility for farmers to increase their land. Because right now the larger farming households sell more, so it is important to look for ways to increase land for the farmers. But our main thinking is that the smallholders should be part of agricultural growth regardless of how it is done. But in situations where there is no possibility for the farmer to increase her land then let us give her a way to get more out of her 1 hectare e.g. moving into higher value crops.

Q: So is it fair to say that it is not about the land not being there but about access to land...because you mentioned that there are people that have bought 40-50 hectares but are not using the plots...

A: I talked about land fallowing and opening up of land. For a small scale farmer to increase, the lands need to be opened up. There is also the issue of most of the land being under government game reserves. These are slowly being opened up, and investors are moving in.

Comment: I think the question of how best to integrate smallholders is very important and should be discussed tomorrow. We need to look at how the small holders can fit into the ag system for the next 10-20 years. The farmer org leaders always say that the smallholders have to be in the picture, but what we observe is that when the FDI comes, in the picture changes. In Senegal for example, a French company invested in a tomato-processing business. The productivity of the small producer increased by 3-5x and they had business models contracting with small holder and coops providing output while the company facilitated input.

Comment: so it is fair to say that the small scale farmer and out grower schemes are good, but we will only decrease poverty if these are strategically cropped.

The challenge question is how can you provide the govt alternative policy action to move to a more sustainable policy without affecting the production levels achieved? Since



increased production has already been achieved, how can its benefits translate to other areas?

Response: this program has not been diversified and the production increase has been only for maize so there is a demand for expansion to rice and groundnuts.

### **Hitimana Presentation**

#### **Presentation Summary – Ag Transformation in West Africa; Resettlement, Markets & Food Security**

The presentation highlighted the remarkable demographic changes in W Africa (high popn growth, rapid urbanization), as well as the major challenges in quantifying these trends such as defining what's 'urban' (needs harmonization), and assessing the availability of land (AEZs). Some other important points of discussion included; the informal economy as an important sector but one for which we have little data on (up to 30% of GDP), how to keep track of internal trade flows (e.g. rice), the need for smallholders to gain access to markets and better targeting of infrastructure investment (roads, water).

#### **Q & A/Comments:**

Q: so what you are suggesting is that the informal economy is important for focusing ag and food security because the informal sector drives migration from rural to urban areas, because generally it is the differential wage rate btw the 2 areas that drives people from one to the other. So when you have the flow from rural to urban there is less labor supply in ag, but it may translate to more demand for food processing in the urban areas.

A: This is true, and we are attaching some of the policy aspects. In many countries, many will assume that the informal sector is bad for the economy but it is not it is a dynamic sector that has a high potential for creating jobs and opportunities.

Q: What is the ideology behind the growth story? What type of agriculture are we projecting? How do the smallholders fit in?

Comment: it will be interesting to look at rural populations around cities as well as far from cities so we can figure out if those around the city are moving or not and if those further away are and why.

### **Ismael Presentation**

#### **Presentation Summary - Growth & the CAADP Agenda**

This was a presentation of the framework used to evaluate CAADP-focused investments. The presentation how the framework involves an identification of major demand-side drivers such as population and income, tries to identify how urban/rural populations are affected by policies, uses an economy-wide framework to better capture the dynamics in important factor markets and the implications for hhold welfare, and evaluates alternative scenarios to reach CAADP and MDG goals. The presentation also pointed out some data/methodology challenges such as linking the macro & micro sides of the analysis, and quantifying links to the rest of the economy.

#### **Q & A/Comments:**

Q: How do you account for critical shocks in the ag-focused CGE model?

A: technically there is no solution. So you do not need to go 20-30 years rather focus on recent trends, because if you account for 20 years before you are far from the reality of your economy today. So in this case you have to decide when to start and stop because you cannot start from a shock and end with a shock. You can so do some alt scenario analysis but CGE does not take these into account e.g. monetary policy shocks. Rather use a DSGE model and fee in the shocks. But in CGE you can analyze shocks like price of energy change etc.

Comments: we see that in some countries because of govt subsidies it is easy to achieve agric growth but that does not necessarily translate to poverty reduction. So there is a need for projections that determine exactly how much growth is necessary to achieve the desired MDG goal of 50% poverty reduction by 2015.

Q: Does sequencing matter in your work? I.e. if there is a series of projects a country wants to implement, does doing one project first affect the performance of others that come after?

A: this is something we are thinking about. Probably the different investments may not have the same efficiency or return depending on sequencing. But the first thought is what type of investments the govt is involved in. For example investment in public goods is supposed to have a higher return than fertilizer. A lot also depends on how you define return. So sequencing is important because it can help prioritize and follow through on investment and connect sectors.

## **Foresight Workshop Day 2 [25 Oct]**

### **Tanja Presentation**

#### **Presentation Summary - Foresight & Drivers of Change**

Futures thinking/studies/research is used interchangeably with foresight which is fine. All 4 are very different from forecasting and predicting. Forecasting is more about a causal quantitative model unlike foresight which does not use causal quant modeling. However forecasting results can feed into foresight and vice versa.

The idea is to go back and forth between the 2 and create the most robust system.

Foresight underpinned by systems thinking and has many different methodologies some of which are qualitative, some are quantitative. Futures studies is an academic discipline but can be studied under different disciplines, pol science, social change theory, management studies.

#### **Why futures work?**

There are many futures. Begin with a unit of analysis – a person, company, country etc. most units have a fairly good idea of the future in terms of the next 6 months. If you go further into the future, the possibilities increase enormously and you have a wider range of possibilities.

If you have decided on a preference in terms of future options, the next question is what are the choices/decisions I need to take NOW to make it more likely that I end up in the future that I want?

The idea is not to try to guess where you are going to be, but rather to take the best decisions now with the hope that you end up in the best possible future. Tiny changes now can have a huge impact later/over time. This is social systems thinking.

The smaller the system, the more likely you are to have a bigger impact.

#### **Why Scenario Planning?**

Systems thinking is synonymous with an iceberg. Most people are reactive, but it is important to go below the surface to see how a system is structured and related.

So if you have a unit of analysis with all the basic influences, political, economic, social, technological, legal and environmental, what shapes the unit of analyses is not the surface, but the relations and interactions between these factors.

There are futures research tools for analyzing these relationships.

*WEF slide* - World Economic forum work looking at systemic global risks looks at these various factors and how they work in on each other and how one risk can trigger another

as well as different strengths of relationships. Virtuous and vicious circles determine how things will occur and result.

What is driving the future of African agriculture – the 20:30:40 – (**note to self**: see author of this book based in Pakistan affiliated with NYU)

(See Life Sustaining resources diagram) - see *Global stresses give rise to complexity slide* (**note to self**: see titles by Tom Hommer Dixon) In order to manage the future we need – complexity, resilience, adaptively, creativity, diversity.

(**Note to self**: look up Mckinsey global institute study of Africa in 2020)

### **Discussion on assumptions:**

Informal trade in Africa is far surpassing the formal regional trade agreements (see spaghetti bowl of trade agreements slide) proving the idea that many of these regional trade practices and agreements are more form over substance. (See FEWSNET for analysis of informal trade).

Assumptions about what is happening along the agricultural development process should be mindful of the fact that we have skipped a lot of steps (industrialization, etc) and moved straight into ICT and mobile technology. Paul Collier wrote that the only way to bridge this gap is through waged labor funded by the development of extractive industries.

(note to self – see Brookings poverty map article)

There are still a lot of questions surrounding the presumed benefits of urbanization – people moving out of urban areas to cities are not necessarily gaining the presumed welfare benefits and are ending up just moving back out again and those that stay still stay poor and have large families and the urbanization mindset does not take over.

(See slide on key agricultural uncertainties and scenario game board)

The stories of the future from the game boards are what informs the quantitative modeling and vice versa. If the foresight exercises want key messages for decision making they can be informed by the game boards.

(see slide on scenarios for different purposes)

### **Q & A/Comments**

Q: what is the time frame to get from the present to the *Full Monty*? Because when you forecast you can forecast 20-30yrs ahead

A: this is not prescriptive i.e. saying we are going there. Initially we were working with a 30 year time change, but I decided to work with 10 years due to the dynamic nature of Africa. I thought that once we do this, then we can project out into the longer term future. The rule of thumb is always more than 5 years because less than that causes you to fall into the early trap.

There are other techniques that you can use such as looking at first second and third horizons and you can look at the game boards and determine/pinpoint where these horizons are. But the first go at it was for 30 years because we were also considering climate change.

What we were saying is that we are likely to get some sort of progress on market access before land ownership, but if there is a lot of FDI and infrastructural development we may get onto a faster path.

Q: in general we have more than 2 dimensions and what people generally do is to say that we have maybe 10 dimensions with intervals of possibility and we pick up stochastically for each dimension a value then you have your scenario. But what you are saying here is you are trying to build a scenario based on your understanding of the paths you are having then you do some tentative analysis?

A: the value is not in the output but the process. If you spend 2 days with policy makers coming up with their own game boards it makes the process richer. So you are facilitating strategic conversation.

The Process:

- Begin by getting 10-20 people from different disciplines and you begin a conversation about scope and context i.e. ask what is the unit of analysis? Contextual environment? Timeline? ...and you capture these.
- Next you ask who are the players in the game called the future of African agric? We say game because game theory is underpinning this.
- Then you ask what are the driving forces and the key part here is which of these are certain and which are uncertain e.g. we know for sure that ICT is going to change ag future for sure and the you have uncertainties (see ag uncertainties slides) you can use any 2 of the uncertainties from the slide and work in the rest. So you pick ones that are very uncertain and have a very high impact.
- Then you use the uncertainties to generate some scenarios.
- Once you have scenarios and the game board, you play it out and look at what is preferable, where driving force is pushing you, where feedback is pushing you, what are risks and opportunities.
- Based on this you do the back-casting and then ask now what? What are the things we need to do? Where are we going to put time money and energy? Which of these things are 1<sup>st</sup> and/or 3<sup>rd</sup> horizon i.e. to do now or in 3 years.

If you want you can stop at the scenarios and use that as a tool to frame thinking about inputs into the stochastic model, because what this method does is that it takes you away from having multiple scenarios that are oversimplified and are just variations of the base case and give you completely different versions of the future.

The 3 planning horizons: 1<sup>st</sup> horizon is what we are seeing and doing now. The 2<sup>nd</sup> is where policy and strategy conflicts are played out. It is where the 1<sup>st</sup> becomes less and less relevant but the 3<sup>rd</sup> where we should be going has not kicked in yet. This is where we generate scenarios and use these to take better decisions and allocate money to where we want to go in the 3<sup>rd</sup> horizon (see paper on how to make multiple decisions across horizons for planning purposes paper)

### **How to cope with transformation**

- Do not try to predict but experiment
- Act exuberantly via diverse adventures in living – this leads to a strategic sense of how to proceed
- Do not try to plan the details- invent and build
- Encourage innovation though a rich variety of transformative approaches
- Encourage experiments that have low cost of failure that have a low cost of failure because many will fail
- Incentivize people to take risks and experiment
- Protect and communicate the accumulated knowledge and experience need for change.

Q: how can we find solution to be at the middle btw trying to solve today's issues while taking care of tomorrow?

A: try to get them to be experimental. Do the things you need to do today, but do not put it all in there. Take a little bit for the future. (see paper on Singapore in drop box). This stuff

does not go well liberal democracy but better with benign dictatorships who are not as concerned with their 4 or 5 year terms.

Comment: in India they have organs of government that try to do some forward thinking but knowing that the politicians themselves will change but the body as a whole still looks forward.

This is a powerful method especially when working with smaller systems e.g. a provincial transport department. They completely changed the way they work and changed their reward and incentive system which was very useful. They had a supportive head but they had to convince a not so supportive policy maker. So you may not be able to get all of African ag into the *Full Monty* but you may be able to get small groups ahead.

### **Discussion of “Key Questions” slide from John’s Presentation.**

The linkages between the ag and non-ag sectors are very important – as they are key in determining the way the extent to which agriculture can lift people out of poverty. Essentially, you need non-agricultural policies to accelerate growth and to encourage the demand for agricultural products that small-holders produce. Take the example of Guinea – where there’s almost zero transformation of agricultural products (since most of the finished goods come from the outside). So policy interventions don’t have as much of an effect as in other places. Without transformation into agro-industrial products, it becomes difficult to keep surpluses.

It might be possible for agriculture to piggy-back on opportunities created by infrastructure development – like is happening in Southern Tanzania along the TAZARA railway corridor.

What pathways other than ag will become important food security and agriculture – there is a lot of urban ag/food production in Africa right now, but it is not ag really, but there is a lot of work in this area happening in other fast growing cities of world, and this is something that can be replicated, scaled or replicated in Africa. Take the case of Antananarivo (Madagascar), where 75% of food is coming from there – although mostly from small-scale farms.

That sort of farming generates a whole new range of activities that surround and support. We are entering a complex system by what is happening in the urban areas with agriculture. Different inputs, different value chains, different range of services. So we are moving from simple farming to a complex agricultural system. It is important to give it a name that makes sure that people recognize the ag support services and not just the food production. Maybe we can move towards “more proper” urban farming, Southeast Asia-style.....

Take as an example; groundwater pumping in East and South Asia, there is a cottage industry of people that make, service and deliver groundwater pumps. In Africa, we have a whole industry about the service of mobile phones. Projected into the future it could be services around rain water harvesting, effective management around space if we are talking about urban slums. This will not be called agriculture but something else.

An important aspect to mention here is that there is urbanization happening in Africa that will continue and affect the demand for food. But more income is also an important factor. Urbanization follows income growth, but in Africa we have urbanization but people are not getting richer, so here is a demand for increase but not a huge one. We have found in Senegal that urbanization is demand driven but more supply because people just want to leave rural areas. However their productivity is lower in urban areas than in the rural. So the income part of the story is important and is linked to what is going to happen to the non-ag sectors.

So how does the role of the missing middle-class come in? In pre-colonial period new middle class grew from the expansion of the civil service but this was not sustainable as

we know because these were jobs aimed at providing government services that are non-tradable – and which relies on taxing the few tradeable exports that the countries produce. But now it looks like there is a new growth of the middle class. There are also increasing trends of urbanization, but since this is not being driven out of a strong growth in manufacturing sector (e.g. electronics, textiles or anything similar), and mostly consists of people moving to bare subsistence in the informal sector – this is not producing the kind of income growth and demand-side effects that would help pull up the rest of the economy. So there has been a persistence of peri-urban subsistence patterns.

Even among very poor people you see nutrition transmission from staples into wheat and this is a lifestyle change. This exacerbates vulnerability and protectionism again because of wheat price volatility (both Rhoda and Ferdi touched on this in their presentations).

Do you think the private sector would be interested in collaborating/establishing case studies?

Perhaps – but one needs to keep aware that the private sector has their own agenda (e.g. Syngenta, Croplife, etc.) – so you always have to think of ‘what’s in it for them?’

When the money comes for this kind of work, it is very proprietary. If they are interested in funding this stuff, they want it for themselves. But you can motivate it in a way that convinces the private organizations to allow you to use the process derived from their analysis to other relevant sectors.

Perhaps start with a simple case, and try to learn from that.

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### 13.3 Appendix 3: An inventory of African foresight for agriculture by GFAR

In 2012, a quick 'inventory' of foresight studies on agriculture was carried out by the Global Forum for Agricultural Research (GFAR) in order to understand the state of foresight (and how it is used for agriculture), and the variety of methods and messages that have been generated in various regions of the world.

From the results of a survey which tried to elicit responses from various researchers and stakeholders around the world – it was found that relatively little has been done for Africa. In the words of their report:

*The first striking element is the quasi absence of Sub Saharan African foresight.* Only four cases have been identified. These are from South Africa, the most developed country of the continent or result from a cooperation with a regional or international organization. We have not been able to identify any national foresight work a part from these cases.<sup>10</sup> This finding is consistent with the EFMN report results stating that Africa remains underrepresented here." Yet, Africa is included in some international foresight activities (including participation of African teams in the UK Foresight Programme, in the BFP/CIAT and the CCAFS programmes).

(Bourgeois 2012, p 20)

The studies on Africa that were cited in this survey were the following:

**Brief No. 03: No foresight, no food? Regional scenarios for Africa and South Asia** (CCAFS)

**Brief No. 10: Bureau for Food and Agricultural Policy (BFAP): Your partner in decision making** (BFAP)

**Brief No. 12: Bringing agricultural research back to the African agenda**

**Brief No. 14: How might agriculture develop in Southern Africa? Making sense of complexity** (SASP)

**Brief No. 21: Debunking the water scarcity myth: understanding future water use challenges** (BFP/CIAT)

Which can be access from the GFAR website: <http://www.egfar.org/content/foresight-write-workshops>

The full version of the global report on foresight for food and agriculture can be accessed at:

[http://www.fao.org/docs/eims/upload//305471/State\\_of\\_foresight\\_%20SectionF1\\_Edited%20DO.pdf](http://www.fao.org/docs/eims/upload//305471/State_of_foresight_%20SectionF1_Edited%20DO.pdf)