

Research as the key to Agricultural Transformation

A. W. Mwang'ombe

Introduction: WHY emphasis on agriculture

- ▶ African Economies are dependant on Agriculture
- ▶ Agriculture is the life–blood of the African economy. Some 75% of the continent's population are farmers, and the crops they grow provide an important means of livelihood for the most vulnerable smallholder farmers.
- ▶ Agriculture also gives those in the rural sector access to a potential source of additional income if they have surplus crops that can be sold at market.

Introduction: WHY emphasis on agriculture

Agriculture still remains the backbone of the national economies of most ECA countries

For example – KENYA:

- ▶ Agriculture contributes directly 26% of GDP and 60% of export earnings
- ▶ Through links with other sectors e.g. manufacturing and service-related, agric indirectly contributes a further 27% to the GDP
- ▶ About 70–75% of population lives in rural areas and derive their livelihood from agriculture

Introduction :Food and Nutrition security and poverty status

- ▶ The current state of food security on the continent remains precarious.
- ▶ Africa has remained the only region where hunger is on the increase despite the decline in the proportion of the world's hungry people over the past 20years.
- ▶ The current challenge Africa is to feed the 1 billion people.

COUNTRY GLOBAL HUNGER INDEX SCORES BY RANK, 1990 GHI, 1995 GHI, 2000 GHI, 2005 GHI and 2013 (IFPRI-2013)

Country	1990	1995	2000	2005	2013
Ghana	25.5	19.6	15.6	10.7	8.2
Kenya	21.4	21.0	20.5	20.2	18.0
Rwanda	30.8	37.3	29.0	23.6	15.3
Uganda	21.4	22.9	19.9	18.6	19.2
Tanzania	23.4	26.9	26.1	20.5	20.6
Ethiopia	42.3	42.7	37.1	31.0	25.7

Highlights

- ▶ Current focus is on how to feed the seven billion people
- ▶ By 2050, the world population stands at 9.0Billion
- ▶ The question is what strategies do we need to be able to handle this growing population

Food Situation

- ▶ World agriculture has been successful in keeping up with world population growth over the last half of the 20th Century. In fact, agriculture's food production had increased faster than population during this time period.
- ▶ The value of food production has increased rapidly during this period, most of which occurred in the developing countries.

Increase in World Production of Major Commodities(1969 - 2009) (metric tons): FAO

Crop	1969	2009	% Increase
Sugar Cane	538	1661	209%
Maize	270	819	203%
Wheat	309	686	122%
Rice, Paddy	296	685	131%
Cow milk	358	583	63%
Cassava	95	234	146%
Soybeans	42	223	431%

Highlights

- ▶ It is important to note that although world agricultural production increased faster than population growth, which resulted in an increase in production per capita, this increase was not distributed evenly across the globe.
- ▶ Sub-Saharan Africa showed a decline in per capita agricultural production during this period

Observations made

- ▶ *Increasing investments in agricultural research for development (R4D) could bring the much-awaited agricultural transformation to Africa and help address the rising wave of youth unemployment and its attendant poverty, hunger and malnutrition according to the President of the International Fund for Agricultural Development (IFAD), Dr Kanayo Nwanze.*

Highlights: Can Agriculture Meet Future Food Needs

- ▶ World agriculture has met the food needs of an increased population and expanded world economy during the last half of the 20th Century, agriculture's ability to meet the needs of an additional two billion people during the first half of the 21st Century is an open question.
- ▶ The Food and Agriculture Organization estimates that food production will need to increase by 70 percent by 2050.



Highlights: Can Agriculture Meet Future Food Needs

- ▶ ***Increase Yields and/or Expand Cropland Area***
The traditional approach to increasing world food production has been by expanding production area and increasing yields.
- ▶ The historic increase in world production of the three major commodities: wheat, corn and soybeans from just over 400 million metric tons in 1960 to over 1,700 million metric tons in 2010 was mainly as a result of yield increases.
- ▶ Cropland area expanded only modestly over the time period.

Highlights: Can Agriculture Meet Future Food Needs

- ▶ Looking forward to 2050, the lion's share of the production increase will need to continue to come from increasing yields.
- ▶ The ability to significantly increase farmland area is limited.
- ▶ In addition, the environmental damage and greenhouse gas emissions from expanding land area are great .
- ▶ So the focus will continue to be on increasing yields to meet world food demand. Concerns have been raised about the ability of the U.S. and other parts of the world to continue to increase yields due to reduced expenditures for research and technology, and rising input costs as more countries expand their use of fertilizer and other key inputs.

Highlights: Can Agriculture Meet Future Food Needs

- ▶ The former Soviet Union and Sub-Saharan Africa yields have lagged the rest of the world.
- ▶ The U.S. and world populations are expected to grow by approximately 30% by the year 2050, and world real income per capita is expected to grow by 98% (Nelson et al. 2010).
- ▶ Population and income growth translates into rapid growth in the demand for high valued food e.g., meat, fish, fresh fruits, and vegetables and for feed for livestock.
- ▶ These changes will place increasing demands on arable land and freshwater.

Highlights: Can Agriculture Meet Future Food Needs

- ▶ Worldwide, remaining land that might be brought into production is largely in tropical rainforests.
- ▶ Deforestation to obtain additional cropland to produce needed food and feed for the future would have adverse impacts on the environment and biodiversity (Foley et al 2005).

Highlights: Can Agriculture Meet Future Food Needs

- ▶ Although agricultural productivity growth during the last two decades of the twentieth century was sizable in developed countries and in some developing countries, they built on past investments in agricultural research.
- ▶ Worldwide and in the United States, however, investments in public agricultural research have slowed since 1980 (Huffman and Evenson 2006a; Pardey et al. 2006).
- ▶ In the United States during the same period, private agricultural research and development (R&D) has been growing significantly faster than public agricultural research (Alston et al. 2010; Huffman and Evenson 2006a).

Highlights: Can Agriculture Meet Future Food Needs

- ▶ Agricultural research takes many years to become fully apparent:
- ▶ . Disease producing organisms and other pathogens continually evolve and threaten past advances in crop and livestock productivity so that science and technology are hard pressed to maintain, let alone increase, future agricultural productivity.

Highlights: Can Agriculture Meet Future Food Needs

- ▶ Producing additional food through the use of nonconventional inputs requires organized R&D and investments in skilled manpower (efforts of scientists, technicians, and laboratory and research assistants) as well as other services (biological materials, laboratories, computers, computer software, greenhouses, offices, and available transportation).
- ▶ In the United States, most of the research in general, basic, and pre-invention sciences occurs in public and private universities and government institutions, whereas applied research is shared among universities, government institutions, and private firms (Huffman and Evenson 2006a).
- ▶ New innovations are further developed and tested by the private sector before they are sold to U.S. farmers and others.

Why Not Let the Private Sector Undertake Agricultural Research?

- ▶ Farms in Africa are too small and certain crops are too minor to bear the cost of R&D to develop most new farm technologies.
- ▶ Private agribusiness firms cannot expect to recoup enough benefits to cover the costs of innovations that (1) decrease soil and water erosion and improve
- ▶ air and water quality;
- ▶ (2) analyze impacts of commodity and trade policies; and
- ▶ (3) reveal new information about diet, nutrition, and health as well as about rural and community development.

Why Not Let the Private Sector Undertake Agricultural Research?

- ▶ Farmers and consumers need transparent, objective information so that they can make good investment, production, and consumption decisions
- ▶ Intellectual property rights are a key driver of investment in R&D, innovation, and knowledge dissemination in private sectors.

Why Not Let the Private Sector Undertake Agricultural Research?

- ▶ Private agribusiness firms cannot recoup the benefits from basic or general scientific discoveries that advance the frontiers of knowledge, even though they are worthy social investments.
- ▶ Private firms have limited interest in on-site training of new scientists for the future

Sustainable Development:

- ▶ Africa needs to intensify in developing the capacity to sustain growth at levels required to achieve food self sufficiency, poverty reduction and sustainable development.
- ▶ To foster agricultural development, the AU and NEPAD launched the Comprehensive Africa Agriculture Development Programme (CAADP)

Some Current Initiatives

- **Developing an integrated vision**
- **Strengthening agricultural sector governance**
- **Improving rural productivity: several initiatives: fertilizer and other inputs subsidies, capacity building covering both informal and formal; new varieties/ technologies.**
- **Accessing remunerative markets: still a challenge in some cases**
- **Managing the natural resource base in a sustainable manner: Still a challenge**

Challenges faced as a result of CC

- ▶ Floods in certain areas: crops and livestock get submerged
- ▶ Severe droughts leading to crop and livestock losses.
- ▶ At times and in both cases: this leads to human loss.

Wilting Crop during drought of 2005/06



Some of the many which succumbed to effects of droughts of 2005 in Kenya



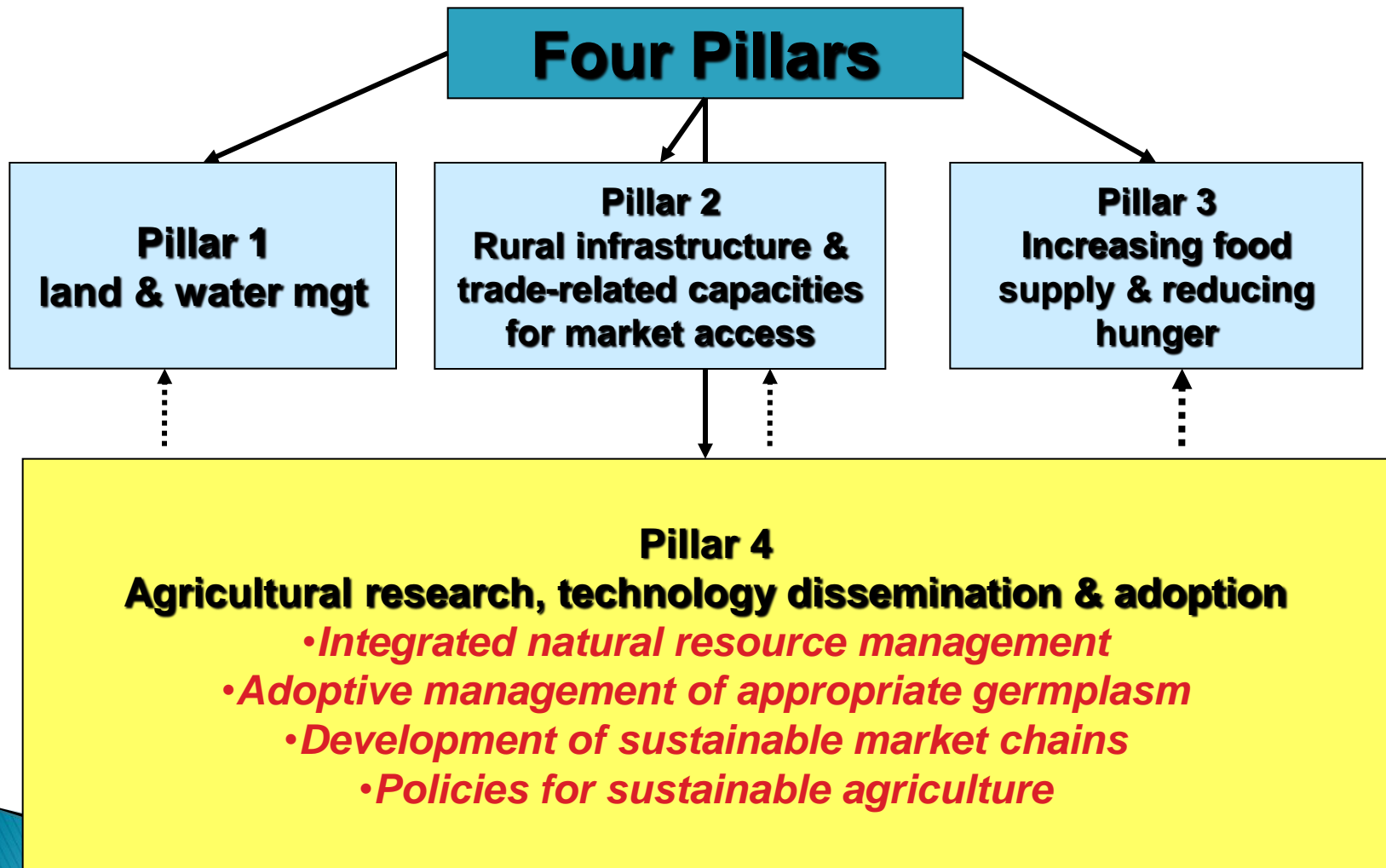
African vision by AU/NEPAD

*Regional agricultural production
to grow at an annual rate
of 6% by 2015.*

Achieved by:

- ▶ **Dynamic agricultural markets** among nations and between regions
- ▶ Be a **net exporter** of agricultural products
- ▶ Have **food available and affordable**, and **equitable distribution of wealth**
- ▶ Be a **strategic player** in agricultural S&T development
- ▶ Have a culture of **sustainable use of natural resources**

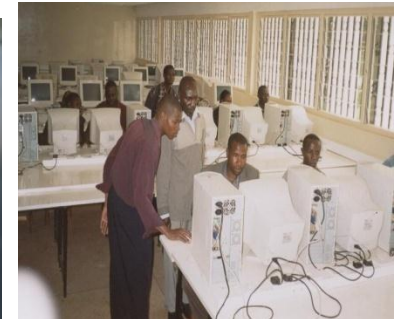
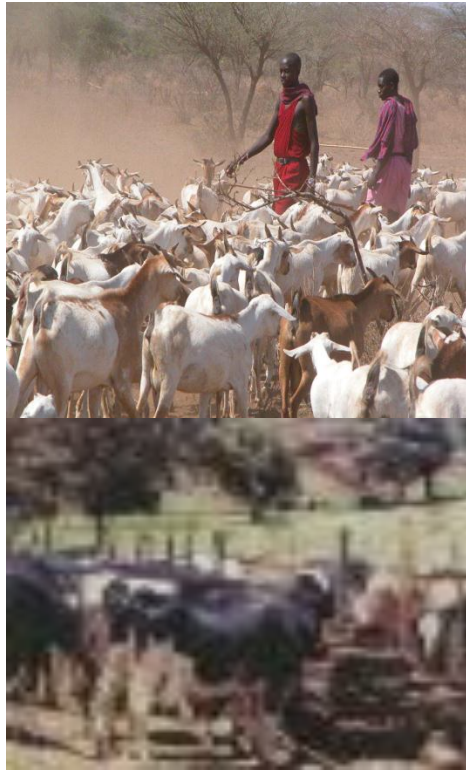
Comprehensive African Agriculture Development Programme (CAADP): the African response (2003)



CAADP:

- ▶ Take stock
- ▶ Policy reviews
- ▶ New policy and Implementation Frameworks
- ▶ Investment plans

Example for Food and nutrition security from College of Agriculture and Veterinary Sciences, University of Nairobi



VISION 2030

- ▶ The economic pillar: Moving the economy up the value chain: six sectors identified to grow economy to 10%
 - Tourism
 - Agriculture (i) transforming key institutions to promote agricultural growth (ii) increasing productivity of crops, livestock, fish (iii) introducing land use policies for better utilization of high and medium potential lands (iv) developing more irrigable areas in arid and semi arid lands for both crops and livestock (v) improving market access for our smallholders through better supply chain management

In addition vision 2030 aims to add value to our farm and livestock products before they reach local and international markets

Agricultural Research: Changes in engagement

- ▶ Key characteristics of the current agricultural research paradigm are as follows:
 - Impact.
 - National frameworks. A greater focus on ensuring that research is seen as a part of joined up poverty reduction efforts and not as an independent supply of research products
 - Systems reform. The shift to a NARS and innovation systems approach is changing the systems in which agricultural research is conducted,

Agricultural Research: Changes in engagement

- ▶ Key characteristics of the current agricultural research paradigm are as follows:
 - CG reform: Focus on 4 SLOs
 - Broadening of research. A move towards business unusual so that not only is technological research done differently, but also the research agenda is broadened to include policy and institutional issues related to enhanced impact.

Agricultural Research: Changes in engagement

- ▶ Key characteristics of the current agricultural research paradigm are as follows:
 - African research reform. A major shift in the institutional arrangements for research and accompanying capacity to deliver effectively in Africa through the framework of CAADP's pillar 4, overseen by FARA and based on four Sub-Regional Organisations (SROs): CORAF/WECARD, ASARECA, NASRO and CARDESA.

Agricultural Research: Changes in engagement

- ▶ Key characteristics of the current agricultural research paradigm are as follows:
 - New global institutional arrangements. CO and AUC–signed an MoU.
 - Through interrogation of partnership arrangements to better deliver impact, CRPs (CGIAR Research Programs) are further being relooked with a view to better engage with partners but at different levels –Regional, Sub regional and even at National levels.

Commitments by Governments

- ▶ Agricultural Researchers should still come up with real data on resource allocation towards Agricultural Research and attendant capacity development to be able to lobby for more resources/ investment in this sector.
- ▶ At the moment many of the African policy makers are believing that with the discovery of minerals/oil then we do not need to focus on Agriculture as we can import food. This is a big mistake.

- ▶ Thank you very much for the invitation and your audience.