

Challenges to Agricultural Development in Africa



Africa has abundant arable land and labour which, with sound policies, could be translated into increased production, incomes and food security. This has not materialized because of lack of consistent policies and/or effective implementation strategies. Thus, despite agriculture accounting for 70 per cent of the labour force, over 25 per cent of GDP and 20 per cent of agribusinesses in most countries, it continues to be given low priority. Agriculture also has a high multiplier effect, which means that agricultural investment can generate high economic and social returns and enhance economic diversification as well as social development.

Strategies for transforming African agriculture have to address such challenges as low investment and productivity, poor infrastructure, lack of funding for agricultural research, inadequate use of yield-enhancing technologies, weak linkages between agriculture and other sectors, unfavourable policy and regulatory environments, and climate change. This chapter discusses these and other challenges with a special focus on the commodities identified at the African Union Abuja Food Security Summit (2006) as vital for enhancing food production at continental and sub-regional levels.

The continental-level commodities are rice, legumes, maize, cotton, palm oil, beef, dairy, poultry and fisheries, while regional-level commodities include cassava, sorghum and millet. Among other measures to overcome constraints to agricultural transformation on the continent, the analysis highlights the potential role of regionally integrated value chains and markets. The challenges, opportunities and benefits as well as specific measures to develop value chains are discussed in detail in chapter 5. Owing to data constraints, the analysis is based on the RECs, although they often have overlapping memberships.¹ These RECs comprise AMU, the Community of Sahel-Saharan States (CEN-SAD), COMESA, the East African Community (EAC), the Economic Community of Central African States (ECCAS), ECOWAS, the Intergovernmental Development Authority (IGAD), and SADC.

“
Sound and sustained institutions critical for transform agriculture
”

¹ This leads to some duplication of data and some distortion in comparisons.

4.1 Analysis of trends and status of African agriculture

“ African agriculture remains largely traditional ”

African agriculture remains largely traditional and concentrated in the hands of smallholders and pastoralists. Given the dominance of rain-fed agriculture, yields are low and farmers can be trapped in a cycle of poverty and food insecurity for decades. Nevertheless, agriculture remains an important economic sector in Africa, as reflected in its share in GDP across RECs (table 4.1). African agriculture contributed 29.2 per cent of GDP in 1979-81 and 24.6 per cent in 2002-2004 compared with the world averages of 7 per cent and 3 per cent, respectively.

Table 4.1
Share of agriculture in GDP by RECs (percentage)

RECs	1979-81	1989-91	1999-01	2002-04
AMU	13.7	17.7	13.9	13.8
CEN-SAD	31.7	32.3	31.4	29.8
COMESA	29.9	27.2	27.8	25.6
EAC	47.2	41.1	36.5	34.6
ECCAS	25.7	28.7	25.6	24.5
ECOWAS	34.8	34.2	33.1	31.6
IGAD	48.4	39.2	33.1	28.7
SADC	22.4	21.1	19.5	18.7
Africa	29.2	28.5	25.8	24.6
World	7.0	5.0	4.0	3.0

Source: UNECA (2007).

In COMESA, CEN-SAD, EAC, ECCAS, ECOWAS and IGAD, agriculture accounts for between 25 per cent and 35 per cent of GDP. Although the share of agriculture in Africa's GDP declined to about 22 per cent in 2007, as discussed in chapter 2, agriculture still holds the key to future industrialization and poverty reduction in most countries. It provides jobs as well as a livelihood for over 65 per cent of the population of most African countries.

In terms of sectoral linkages, agriculture supplies raw materials as well as final consumer goods to other sectors. At the same time, increased agricultural output and income expand markets for the output of other sectors such as manufacturing and services. This explains why agriculture has a high multiplier effect on the economy, which ranges from 1.5 to 2.7 per cent (UNECA 2006). The multiplier implies that a one-dollar increase in agricultural income would lead to an increase in aggregate income of more than two dollars on average. The experience of industrialized and high-income developing economies shows that although the share of agriculture in

GDP tends to decline over time, agricultural output normally increases in absolute terms. Agriculture should, therefore, remain a priority sector not only for national food security, but also as a driver of growth.

Owing to a combination of climatic and dietary factors, certain subregions are the dominant consumers of certain crops or food types. For example, as shown in table 4.2, Southern Africa is the dominant consumer of maize (32 per cent of African total); West Africa is the dominant consumer of rice (49 per cent), sorghum (50 per cent), millet (77.6 per cent), yam (93 per cent) and marine fish (36 per cent); East Africa is the dominant consumer of cassava (46 per cent), beans (38 per cent), and freshwater fish (44 per cent); while North Africa is the main consumer of bovine meat (31 per cent), goats (44 per cent), poultry meat (38 per cent) and milk (52 per cent).

“Expansion in agricultural production relied mainly the expansion of crop land”

Table 4.2
Consumption of key commodities by subregion in 2004 (percentage of total)

Commodity	Central Africa	East Africa	North Africa	Southern Africa	West Africa	Africa
Maize	2.6	30.6	17	32	17.7	100
Beans	5.4	44.6	2.1	9.8	38.1	100
Rice	2.4	19.9	2.2	7.2	48.5	100
Oil seeds	8.1	20.8	4.1	5.1	61.9	100
Beef	5.7	26.0	30.6	23.1	14.6	100
Milk	2.5	22.5	52	15	8	100
Poultry	2.7	7.8	38.2	36.6	14.7	100
Fish products	7.9	38	21.2	10.1	22.8	100
Cassava	5.0	45.9	0.4	14.2	34.5	100
Millet	3.6	10.7	5.0	3.1	77.6	100
Sorghum	5.7	17	23.3	3.8	50.2	100

Source: UNECA (2006).

Crop output in Africa has mostly increased due to the expansion of cultivated land. The growth in areas harvested ranged from 7 per cent to 20 per cent per annum between 1990 and 2006 (table 4.3). The area for cassava has grown by 20 per cent per annum while the area for other crops has generally grown at below 10 per cent. The growth in yield has been between 6 per cent and 9 per cent, well below the growth in area harvested, except in the case of maize, where yield has grown at a higher rate thanks to the introduction of hybrid maize in some areas. In the case of meat, yield growth has averaged 9 per cent per annum while that of milk has averaged 10 per cent per annum. This is mainly due to improvements in animal husbandry and the introduction of better breeds.

Table 4.3

Average area, growth rates and yield characteristics of some commodities, 1990–2006

	Area harvested		Yield	
	Average area (Million hectares)	Growth rate (per cent)	Yield (mean) MT/ha ^(a)	Growth rate (per cent)
Cassava	10.7	20	8.9	8.6
Cereal	93	8	1.5	7.6
Maize	27	7	1.6	7.3
Meat	10.9 ^(b)	9	-	-
Milk	27.5 ^(c)	10	-	-
Palm oil fruit	4.0	8.4	3.8	6
Rice paddy	7.8	10	2.2	7
Roots and Tubers	19.7	10	8.4	7.2
Sorghum	22	10	0.9	8.5

Source: Calculated from UNECA data, 2007.

Note: (a) MT/ha stands for metric ton per hectare; (b) Million metric ton; (c) Billion litres;

Cereals cover a total area of 93 million hectares, with maize accounting for 29 per cent, rice 8.4 per cent and sorghum 23.7 per cent of the total area. Cassava accounts for 48.6 per cent of the total land under root crops. Yields of the twelve commodities covered show some minor variations across RECs (table 4.4). These variations are mainly due to use of irrigation and other yield-enhancing technologies and practices.² Differences in weather conditions and amount and duration of rainfall are also important since most crop production in Africa is rain fed.

Table 4.4

Comparison of yields and production by REC, 1990-2006

Commodity (unit)	RECs							
	COMESA	EAC	SADC	IGAD	ECOWAS	ECCAS	AMU	CENSAD
Cassava (MT/ha)	7.4	8.8	7.5	8.0	4.6	7.0	-	8
Maize (MT/ha)	1.6	1.3	1.8	1.2	1.1	1.3	1.6	1.5
Millet (MT/ha)	0.7	0.9	0.5	0.7	0.9	0.8	0.9	0.8
palm oil fruits (MT/ha)	9.4	12.2	10.6		7.9	10.8		8.2
Pulses (MT/ha)	0.83	0.7	0.6	0.7	0.5	0.7	0.9	0.8
Sorghum (MT/ha)	1.1	1.1	0.98	0.8	0.8	0.8	1.3	1.0
Rice (MT/ha)	2.7	2.7	1.8	2.8	1.9	1.6	3.7	2.6
Milk (000MT)	802.5	847	5321.4	1901	163.3	85.5	259	217
Meat (000MT)	211.1	214.1	241	274.7	152.2	66.8	627	670

Source: UNECA (2007).

Notes: MT/ha stands for metric ton per hectare.

² The minor variations across RECs may also be due to overlapping memberships.

Measured in metric tons per hectare (MT/ha), yields of cassava are highest in EAC (8.8) and IGAD (8.0) and lowest in ECOWAS (4.6), while yields of maize are highest in SADC (1.8), followed by COMESA (1.6) and AMU (1.6), and are lowest in ECOWAS. The high yields in EAC and IGAD are due to the widespread adoption of hybrid seeds and use of inputs in these RECs. Except for SADC (0.5), yields for millet are almost similar across RECs (0.7 – 0.9MT/ha). Humid West African countries are the traditional palm oil producers, with old plantations and low yields. Other countries have established plantations with new varieties and higher yields. Sorghum yields are relatively similar across the RECs, although AMU, COMESA and SADC have a slightly higher average yield. Yields of pulses are lowest in ECOWAS (0.5), possibly because of the humid climate, while in other RECs they are relatively similar. Rice yields are highest in AMU (3.7) due to the use of irrigation and are lowest in ECCAS (1.6), ECOWAS (1.9) and SADC (1.8). Rice yields in other RECs are similar.

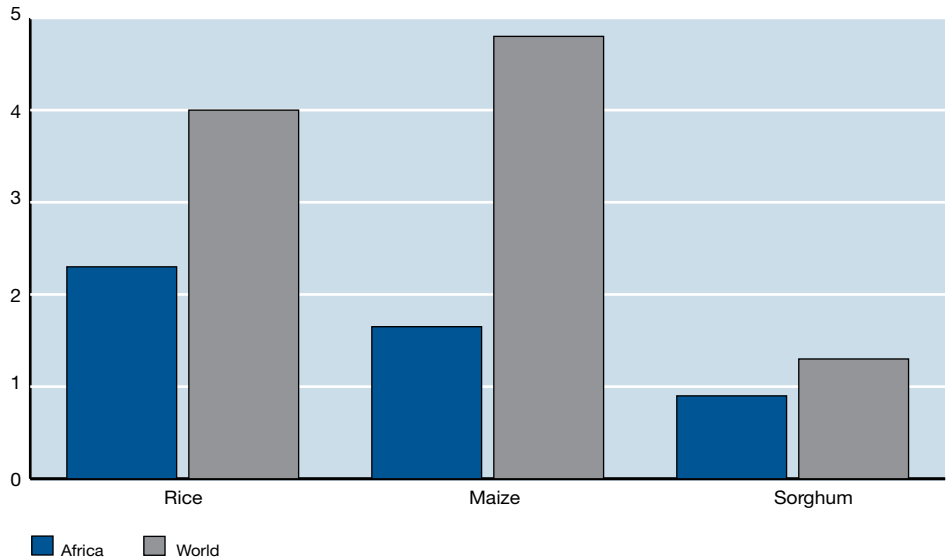
Within the RECs, there is also a wide variation in yields across countries. In ECOWAS, the country with the highest yields of cassava is Niger, whose yields are double the ECOWAS average. Maize yields in COMESA are only 19 per cent of Egypt's irrigated maize yields. Average millet yields in EAC are 66 per cent of Uganda's yields. In the case of pulses, CEN-SAD average yields are 33 per cent of Egypt's yields. Egypt's rice yields are three times those of CEN-SAD, and sorghum yields in CEN-SAD are only 18 per cent of Egypt's yields.

Comparing the yields of common cereal crops with the world averages shows the huge potential gains that Africa can reap by introducing measures to reach the world average (figure 4.1). Africa's yield is 55 per cent of the world average in the case of rice, 34 per cent in the case of maize, and 69 per cent in the case of sorghum. Thus, while Africa needs large investments in agriculture and related services to increase yields in order to reach the world average, the potential benefits in terms of income growth and poverty reduction are quite high relative to other regions.

“
Wide
variation
in crop yield
across RECs
”

““ Four pillars for transforming African agriculture ””

Figure 4.1
Comparison of cereal yields, Africa vs. world (Mt/ha)



Source: FAO (2007).

The above analysis indicates that many African countries depend more on area expansion to increase food production. Africa’s arable land is 733 million hectares, which is adequate to feed the population if efficiently farmed. However, in many countries, land is a limiting factor and emphasis should be placed on increased productivity and sustainable agricultural production practices. Whereas area expansion may be the only option in the short term, governments have to effectively address the challenges discussed below for achieving accelerated agricultural transformation in the long term.

4.2 Challenges to agricultural transformation in Africa

Challenges to agricultural transformation in Africa are well known and approaches to solving them are well documented (Diouf 1989; UNECA 2002 and 2005). The AU-NEPAD (2004) road map on implementing the Comprehensive African Agriculture Development Programme (CAADP) and restoring food security in Africa has identified four pillars for transforming agriculture:

- Improve agricultural research and technology dissemination and adoption;

- Increase food supply chains, reduce hunger and improve response to emergencies;
- Extend areas under sustainable land management and reliable water control systems; and
- Improve rural infrastructure and trade-related capacities for market access.

Challenges to increasing agricultural productivity

The key challenges include under-capitalization of agriculture and research, inadequate use of mechanization and agro-chemicals, inadequate investments in irrigation, and low land and labour productivity.

Under-capitalization of agriculture

Many African governments have treated agriculture as a way of life for farmers who in most cases have no voice in lobbying for an adequate share of public expenditure. Following the Maputo Summit, African countries agreed to devote at least 10 per cent of their public expenditure to agriculture (AU 2003). According to a validation workshop organized by NEPAD in December 2008, only 19 per cent of African countries allocate more than 10 per cent of their national expenditure to agricultural development. Many countries hardly reach 4 per cent of GDP and have depended on ODA for funding agriculture and other sectors. There is clearly a need for governments to increase agricultural investment in order to enhance food production and accelerate economic transformation, given the strong multiplier effect of agriculture.

Inadequate funding of agricultural research and technology

Agricultural research and technology has for a long time been recognized as the key to increased productivity in African agriculture. A number of studies in Eastern and Southern African countries have shown evidence of the high impact of agricultural research. Economic rates of return of agricultural research are generally high, ranging from 117 per cent for sorghum to 30-80 per cent for rice, 51 per cent for wheat, and 29 per cent for livestock. Research undertaken by the Consultative Group on International Agricultural Research (CGIAR) shows high benefit-cost ratios (BCR), ranging from 1: 1.94 to 1: 17.20 with an average of 1: 4.76 (Waibel 2006). Agricultural research has also been shown to create high welfare gains in the economy as a whole (Ehui and Tsigas 2006).

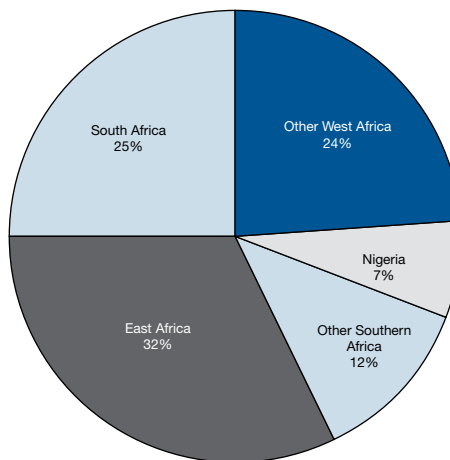
In 2000, research funding in a sample of 27 sub-Saharan African countries from East Africa (7), Southern Africa (6) and West Africa (14) was \$1.46 billion. However, subregional spending totals mask huge variations in research expenditure by country

“ African governments agreed in 2003 to devote at least 10 per cent of their public expenditure to agriculture ”

“ Declining donor support to agricultural research in Africa ”

and per researcher (Beintema and Stads 2004, Spielman 2005). South Africa and Nigeria accounted for over one third of total research spending in the sample (figure 4.2).³ Relative to GDP, East Africa had a larger share of total research expenditure in the sample, excluding Nigeria and South Africa. As indicated above, this has resulted in high productivity for some crops such as cassava in EAC and IGAD areas of East Africa compared with the rest of the continent.

Figure 4.2
Agricultural research expenditure in selected sub-Saharan Africa subregions and countries in 2000 (percentage of total)*



Source: Beintema and Stads, 2004.

Notes: * Total expenditure was \$1.46 billion.

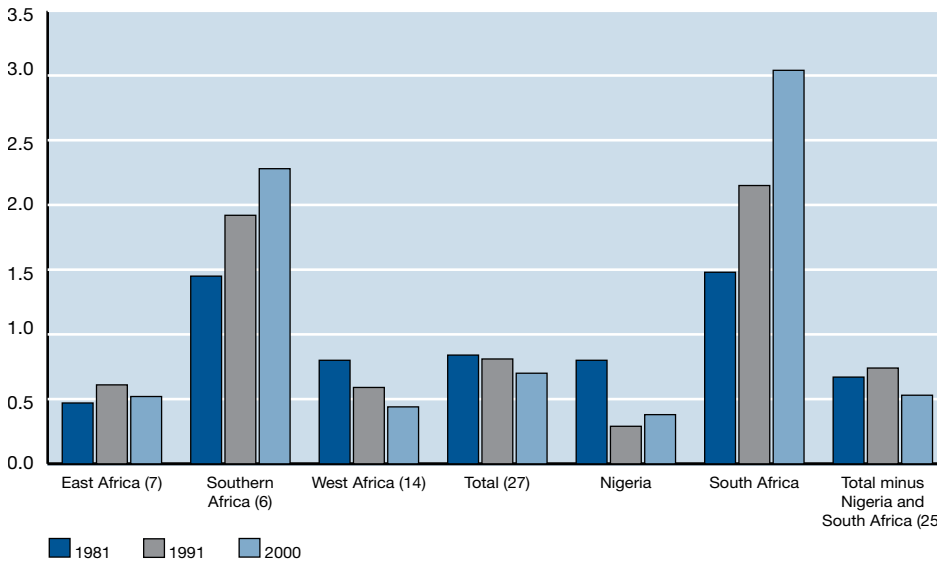
Public spending on agricultural research as a percentage of agricultural GDP (AgGDP) is considered adequate at 2 per cent or more. Worldwide expenditure on agricultural research is about 1 per cent of AgGDP - over 2.5 per cent in developed countries, 0.6 per cent in developing countries and 0.7 per cent in Africa.

Agricultural research expenditure as a ratio of AgGDP in Southern Africa (2.28 per cent) and South Africa (3.04 per cent) is higher than the global average, but for other subregions in Africa the ratio is far less than the global average (figure 4.3). At the same time, donor support for agricultural research declined from \$6.0 billion in 1980 to \$2.8 billion in 2006 and World Bank lending to agriculture in general decreased from \$7.76 billion in 1980 to \$2.0 billion in 2004 (IHT 2008). Undoubtedly, these cuts had serious implications for Africa, which was receiving 42 per cent of the Bank's funding for agricultural research at the turn of the century (Byerlee 2000).

³ The latest available figures compiled by the International Food Policy Research Institute (IFPRI) are for 2000 (see <http://www.ifpri.org/data/dataset.asp> - accessed on 13 February 2009).

Figure 4.3

Agricultural research expenditure in selected sub-Saharan Africa subregions and countries (percentage of AgGDP)



“ SSA ranks the lowest in the world in terms of yield-enhancing practices ”

Source: Beintema and Stads 2004.

The decline in donor funding, which stood at 35 per cent of agricultural research funding in 2000, implies that governments have to rely more on domestic sources. Countries such as Botswana, Burundi, Ethiopia, Gabon, Malawi and the Sudan, already fund over 60 per cent of agricultural research from domestic sources. The private sector contributes only 2 per cent of total agricultural research funding in Africa and its contribution varies across subregions and countries, ranging from 1.6 per cent in East Africa to about 4.3 per cent in South Africa. The private sector should be enabled and encouraged to undertake and finance research, especially in commodities where it has a vested interest.

Inadequate use of yield-enhancing practices and technologies

Sub-Saharan Africa ranks the lowest in the world in terms of yield-enhancing practices and techniques. Yield-enhancing practices include mechanization, use of agrochemicals (fertilizers and pesticides), and increased use of irrigated land. The use of these practices and technologies is low in Africa even in comparison to other developing regions (table 4.5). This at least partly explains why crop yields in Africa in general are far below average yields in other parts of the world.

Irrigated land is only 3.6 per cent of total cropland on the continent compared with the world average of 18.4 per cent, while the use of fertilizers is minimal at 125 gm/ha compared with the world average of 1,020 gm/ha. In the case of mechanization, the con-

continent has an average of only 13 tractors/100 km² of arable land, versus the world average of 200 tractors/100 km². In Africa, tractor ploughing and use of other modern inputs are confined to areas with high market demand or large-scale farms. Therefore, there is considerable variation in the use of these technologies across the RECs (table 4.6).

Table 4.5
Use of yield-enhancing technologies, 2001-2003

Region	Irrigated land (percentage of crop land)	Fertilizer consumption (00 grams/ha of arable land)	Agricultural machinery (tractors/100 km ² of arable land)
East Asia and Pacific	-	-	89
Europe and Central Asia	11.2	347	185
Latin America/Caribbean	11.4	896	123
Middle East and North Africa	32.7	833	142
South Asia	38.9	1067	129
Sub-Saharan Africa	3.6	125	13
Europe EMU	17	2059	1002
World	18.4	1020	200

Source: World Development Report 2007.

Table 4.6
Regional comparison of the use of yield-enhancing technologies, 2001-2003

REC	Irrigated land (percentage of crop land)	Fertilizer consumption (00 grams/ha of arable land)	Agricultural machinery (tractors/100 km ² of arable land)
COMESA	14.4	618.9	59.56
SADC	8	383.1	51
ECOWAS	2.7	100.9	13.5
IGAD	6.3	107.2	11.8
AMU	11.8	270	108
CEN-SAD	8.7	301.4	33.7

Source: World Development Indicators (2004).

The development of irrigated agriculture is highest in COMESA (14.4 per cent of arable land), possibly due to the large irrigation projects in Egypt and the Sudan. COMESA is also dominant in the use of fertilizers (619 gm/ha). ECOWAS ranks the lowest in the use of irrigation (2.7 per cent) and fertilizers (101gm/ha), while IGAD ranks lowest in the use of tractors (12 tractors/100 km²). The highest use of tractors is in AMU with 108 tractors/100 km². The limited use of these technologies coupled with the lack of improved seeds and poor agricultural practices leads to low aggregate output and productivity.

Low land and labour productivity

Under-capitalization of agriculture as discussed above has given rise to an agricultural sector with a weak knowledge base, resulting in low-input, low-output and low-value-added agriculture in most cases. Land productivity in Africa is estimated at 42 per cent and 50 per cent of those of Asia and Latin America, respectively. Asia and Latin America have more irrigated land and use more fertilizers and machinery than Africa.

This is the main explanation for Africa's lower land productivity, which increased from \$9.7/ha (6 per cent of world average) in 1979-1981 to only \$18.3/ha (7 per cent of world average) in 2005-2007 (table 4.7). SADC is the REC with the highest land productivity at \$54/ha compared with AMU at \$16,762/ha.

“ Africa’s agriculture is characterized by low-input, low-output and low value added ”

Table 4.7

Land productivity in Africa (constant 2000 dollars per hectare)

RECs	1979-81	1989-91	1999-01	2005-07
AMU	7965.0	14299.6	12153.3	16761.9
CEN-SAD	1941.5	3017.6	3220.2	3670.7
COMESA	634.3	558.6	580.6	599.2
EAC	155.0	144.6	183.1	212.8
ECCAS	60.2	60.7	2222.7	156.8
ECOWAS	89.7	143.3	172.0	201.5
IGAD	53.8	67.0	83.0	102.0
SADC	37.9	44.2	53.0	54.0
Africa	9.7	10.9	12.9	18.3
World	153.1	191.7	227.5	259.1

Source: UNECA (2008).

These figures demonstrate the potential gains that could be derived from the transformation of agriculture in Africa through productivity-enhancing measures. On average, land productivity on the continent increased by 88.6 per cent versus 69 per cent for the world during the period from 1979-1981 to 2005-2007. This positive trend has to be strengthened and sustained.

Labour productivity is also lower in Africa compared with other developing regions, amounting to only 57 and 58 per cent of those of Latin America and Asia, respectively. This is mainly because most of Africa's agriculture is manual or semi-mechanized. It is worth noting that labour productivity in Africa increased by 39.5 per cent over the period from 1979-1981 to 2003-2005, and amounted to 79 per cent of average world labour productivity in 2003-2005. In SSA, labour productivity

increased by only 10.6 per cent between 1989-1991 and 2003-2005, and was 31 per cent of average world labour productivity in 2003-2005 (table 4.8).

EAC has the lowest labour productivity, followed by IGAD, while AMU has the highest labour productivity at almost 2.5 times the African average and twice the world average. ECCAS and COMESA labour productivities are 84 per cent and 91 per cent of Africa's average, compared with 53 per cent for ECOWAS.

It is worth noting that in addition to education and technical skills development programmes, labour productivity in different countries is influenced by many factors, including the production system, weather, the availability of complementary inputs such as improved seeds and fertilizers, and the use of modern farming technology. Improving access to education and technical skills development in rural Africa will undoubtedly enhance labour productivity in agriculture and related activities.

Yet, as highlighted in chapter 2, progress towards the MDG target of universal primary education is especially slow in SSA where large gaps in access to education also exist between girls and boys and between rural and urban areas. In many African countries, school enrolment ratios are quite low in rural areas and among women, who represent the majority of small farmers. This calls for targeted agricultural education and extension programmes to upgrade skills and ensure effective use of modern yield-enhancing techniques and simple processing and marketing methods for farm produce.

Table 4.8
Labour productivity in Africa (\$/hectare)

REC	1979-1981	1989-1991	1999-2001	2003-2005
AMU	1,020	1,539	1,546	1,769
CEN-SAD	429	490	524	568
COMESA	518	580	628	660
EAC	215	206	211	222
ECCAS	415	394	542	610
ECOWAS	277	327	376	385
IGAD	317	236	250	252
SADC	707	738	805	871
Sub-Saharan Africa		254	273	281
Africa	518	609	657	723
World	648	717	853	911

Source: UNECA (2008).

“ Africa needs targeted education and extension programmes to promote effective yield-enhancing practices ”

Extension of area under sustainable land management and reliable water control systems

Africa has 733 million hectares of arable land (27.4 per cent of world total) compared with 570 million hectares for Latin America and 628 million hectares for Asia. Only 3.8 per cent of Africa's surface and groundwater is harnessed, while irrigation covers only 7 per cent of cropland (3.6 per cent in SSA). Clearly, there is considerable scope for both horizontal and vertical expansion in African agriculture.

However, area expansion should not be a priority in view of increased environmental degradation on the continent. Currently, Africa accounts for 27 per cent of the world's land degradation and has 500 million hectares of moderately or severely degraded land. Degradation affects 65 per cent of cropland and 30 per cent of pastureland. Soil degradation is associated with low land productivity. It is mainly caused by loss of vegetation and land exploitation, especially overgrazing and shifting cultivation (UNECA 2002).

Insecurity in land ownership has been blamed for accelerated land degradation and lack of long-term investments in sustainable land management and stewardship of natural resources. Security of tenure needs to be assured to reverse the deterioration. Soil and water conservation measures, although an integral part of agricultural ministries, have not been pursued rigorously. This has mainly been because benefits from such measures are mostly intangible and long term. However, evidence indicates that in several countries these measures have high net benefits, high internal rates of return (IRR) at farm level, as well as high external rates of return (ERR) at community level. (ENTRO 2007, WFP 2005, Yesuf 2007).

The Nile Basin Initiative, which uses a river basin approach, has demonstrated the potential benefits of soil and water conservation measures (ENTRO 2007). Incremental benefits for the East Nile Basin were calculated at \$13.2 billion and a benefit-cost ratio (BCR) of 2.8 was estimated. In Ethiopia, possibly the most land-degraded country in Africa, the overall BCR is 4.5, with 1.7 for soil conservation bunds and 15.5 for on-farm forage. These figures are robust and strongly justify increased investments in soil and water conservation.

At country level, considerable work has been done in Ethiopia using the universal soil loss equation (USLE) to measure productivity loss due to degradation. Studies have shown on-farm IRR of between 7 per cent and 19 per cent for various measures at farm level (WFP 2005, Yesuf 2007). At watershed level, the ERR has been calculated at 13-16 per cent in dry land watersheds and 9-13 per cent in humid-moist zones. Again, these figures, as in the case of the BCR, are high enough to call for additional investments in soil and water conservation measures at farm, community, national and regional levels.

“
In view of increased environmental degradation, area expansion should not be a priority
”

Concerns over the impact of global warming on agriculture

“
“
Poor
infrastructure a
major constraint
to market access
and agricultural
development
”
”

Global warming is another factor that adversely affects African agriculture. Projections show that it may cause losses of over 25 per cent of agricultural productivity in Southern and West Africa (APN 2008). Countries in East and Central Africa are also projected to experience losses of 5 per cent to 25 per cent. This calls for more research on adaptive agriculture as well as closer collaboration between Africa and other developing regions to address common climatic threats. Additional alarming information shows that climate change will have drastic impacts on African agriculture in the future. Dione (2007) forecasted that there would be reduced productivity of about 10 per cent in rain-fed agriculture in SSA, and an increase in aridity affecting 60-90 million hectares.

Inadequate market access and infrastructure

Promoting agricultural investment and productivity requires improved market access and adequate service infrastructure, including better road networks, communication, rural electrification and water supply. For improved agro-industrialization and domestic and regional trade, the key prerequisites are competitive power and road/rail freight tariffs. Africa performs poorly in all areas of enabling infrastructure and policy (table 4.9).

In terms of paved road density, SSA has a low coverage of 31 km/1,000 km², which amounts to only 23 per cent of the average in other developing regions. The total road density for SSA is 137 km/1,000 km², which is 65 per cent of that of other developing regions. Most roads in Africa are unpaved and impassable during the wet seasons. Improvement of domestic and regional roads has great potential to reduce transportation costs, increase overland trade and enhance the global competitiveness of African agriculture.

The proposed trans-Africa road network connecting cities of over 500,000 people and the road corridor proposed by the African Development Bank (AfDB) is estimated to generate \$250 billion over 15 years in overland intra-African trade (APN-2008). Apart from low road density coverage, road freight tariffs are quite high in Africa (\$0.05-0.25/ton-km) compared with other developing regions (\$0.01-0.04/ton-km).

Table 4.9

Comparison of infrastructure coverage and cost, sub-Saharan Africa vs. other developing regions

	Coverage deficit		Item	High costs	
	Sub-Saharan Africa	Other developing regions		Sub-Saharan Africa	Other developing regions
Paved road density (per 1,000 sq. km)	31	134	Power tariffs (\$/kwh)	0.05-0.30	0.05-0.10
Total road density (per 1,000 sq. km)	137	211	-	-	-
Fixed line density (lines per 1,000 people)	10	78	Road freight tariffs (\$/ton-km)	0.05-0.25	0.01-0.04
Mobile density (lines per 1,000 people)	55	86	-	-	-
Generation capacity (MW per million people)	37	326	International phone calls (\$/3-min call to the United States)	0.80	0.20
Electricity coverage (percentage of population)	16	41	Internet dial-up services (\$/month)	50	15-25
Improved water (percentage of population)	60	72	-	-	-
Improved sanitation (percentage of population)	34	51	-	-	-

Source: World Bank (2008).

Information and communications technology (ICT) is critical in modern-day transactions, but Africa lags behind in this area, as represented by its fixed-line density, mobile density, international calls and Internet dial-up services. Fixed-line density is 10/1,000 people, while mobile density is 55/1,000 people. Fixed-line and mobile density in Africa are about 13 per cent and 64 per cent of the averages in other developing regions, respectively. At \$0.80/3 minutes, international calls cost four times as much as those of other developing regions, while Internet dial-up service at \$50/month is two and a half times that of other developing regions.

Electricity coverage, especially rural electrification, is critical for the development of agro-industries. Overall generation capacity in Africa is 37MW (megawatt) per million people, which is only 11 per cent of the other developing regions' average. Electricity coverage as a percentage of the population is only 16 per cent compared with 41 per cent in other developing regions. Power tariffs are higher in Africa compared with other developing regions.

There is considerable variation in power tariffs across the continent, with differences of up to 15 times between countries, which increase the cost of manufacturing, as shown for some countries in COMESA and SADC (table 4.10). As discussed in

chapter 2, energy and transportation costs in Africa in general have increased sharply over the last few years due to high oil prices. Even though these prices declined in the second half of 2008, energy costs are expected to remain high by historical comparisons.



*Biofuel
production
still limited
in Africa*



Table 4.10

Comparison of electricity tariffs for manufacturing firms (\$US/kwh*)

Country	Base unit tariff	Ad-quantum tariff	Demand tariff	Cost for 10,000 kwh	Cost rank
Malawi	10.01	0.02	0.05	740	9
Zambia	4.10	0.01	0.11	1,246	8
Zimbabwe	0.00	0.16	0.00	1,669	7
Tanzania	0.02	0.15	0.06	2,151	6
Egypt	0.00	0.18	0.11	2,945	5
South Africa	0.00	0.37	0.00	3,683	4
Uganda	0.00	1.09	0.00	10,864	3
Swaziland	0.00	1.10	0.00	11,046	2
Kenya	107.14	1.14	0.06	11,536	1

Source: MTI/JICA (2007).

Note: * kwh stands for kilowatt per hour.

Apart from the enabling infrastructure discussed above, the simplification of customs clearance and improvement of port facilities are essential for regional trade and the development of a more integrated agricultural market in Africa. Customs clearance time ranges from one day in Ethiopia to 25.4 days in Nigeria, averaging 12.70 days for the continent (IFM 2007). Delays at ports (coastal and inland) also imply the need for improvement of port handling facilities.

Provision of enabling infrastructure and services would strengthen the linkage between the agricultural and non-agricultural sectors, especially in rural areas. This would help the landless and the unemployed obtain jobs in agro-industries and associated small- and medium-sized enterprises (SMEs) in rural and urban areas. To accelerate such integration, governments must provide incentives and support to farmers and agro-businesses, including improved access to credit, promotion of entrepreneurship and development of technical skills in general.

Food versus bio-fuel production

As discussed in chapter 3, in addition to historically high energy prices, emerging challenges to food production in Africa include competition from bio-fuel production, which is gaining momentum in many parts of the world due to the recent high fuel prices. However, the downtrend in petroleum prices since mid-2008 may

dampen this momentum. A simulation of the impact of a 30 per cent increase in bio-fuel demand by 2010 on wheat, rice, maize, vegetable oils and sugar shows strong price effects (FAO 2008). Wheat prices would rise by 4 per cent, maize by 10 per cent, vegetable oils by 7 per cent and sugar by 26 per cent by 2010. A decline in bio-fuel demand of 15 per cent would lower wheat prices by 1.5 per cent, maize by 5 per cent, vegetable oils by 3 per cent and sugar by 10 per cent by 2010.

Development in the bio-fuel sub-sector provides both opportunities and challenges to sustainable agricultural development and food security in Africa. Increases in production in response to high oil prices means substantial income for farmers, but the sustainability of this income could be highly uncertain in view of the extreme volatility of oil prices. Furthermore, increased bio-fuel production often means reduced production and supply of food crops. Therefore, bio-fuel policies have to carefully balance the need to respond to market incentives with the need to ensure adequate and stable food supply at affordable prices.

“
*Agro-processing
a key to
overcoming
constraints to
agricultural
transformation*
”

Constraints and need for value chain development in Africa

African agriculture is weakly integrated with other sectors such as the manufacturing sector. By promoting greater sectoral linkages, value chain development can greatly enhance job creation, agricultural transformation and broad-based growth on the continent. Therefore, Africa should take the necessary measures to confront its challenges in this area. Processing of agricultural output is essential for expanding agricultural markets nationally and regionally because raw products are characterized by:

- High perishability, which means a short shelf life;
- Bulkiness as water constitutes a high percentage of agricultural products;
- Quality variability and hence the need for quality standards;
- Seasonal variability in output; and
- Lack of market information (There is therefore a need for transformational processes such as ginning of cotton, milling of cereals, and pasteurization and dehydration for milk (Jaffee and Morton 1995).

Commodity and production characteristics call for a coherent linking of production and agro-industries/agribusiness. However, constraints to such value chain development abound in Africa. In addition to the general challenges to agricultural development discussed above, agricultural processing is limited by lack of capital and credit, lack of appropriate technology, inadequate information, marketing and other externalities that make private investment in agro-industries generally less profitable in the short run.

“Increasing funding to agriculture a key test of government commitment to ensuring food security”

Thus, coordinated government interventions at the national and/or regional levels can be critical for overcoming information and coordination failures that curtail the long-term benefits of value chain development. The challenges, opportunities and benefits of developing regionally integrated value chains are discussed in detail in chapter 5.

4.3 Interventions for addressing challenges to agricultural development in Africa

The challenges facing agricultural transformation in Africa have persisted despite numerous commitments and interventions by African governments and their development partners. This persistence is mainly due to policy inconsistency and insufficiency. The following key measures are necessary to meet those challenges:

Address chronic under-capitalization of agriculture

In many countries, the agricultural sector is in a situation of “a cow being continuously milked and fed only enough for survival”. African governments should:

- Implement the Maputo Agreement to devote 10 per cent of their public expenditure to agriculture, in order to achieve the NEPAD/CAADP goal of agricultural growth of at least 6 per cent annually by 2015; and
- Create an enabling environment for the provision of adequate financing and credit facilities by both the public and the private sectors for the funding of agricultural production, processing and marketing. This should include the promotion of microfinance institutions and insurance schemes to serve farmers.

Promote sustainable agricultural production systems

Agricultural production has to a large extent been based on increasing the area cultivated to meet food demand for an increasing population. This strategy is a recipe for environmental degradation and increased food insecurity. There is therefore a need to promote sustainable agricultural production based on increased productivity, while protecting the environment. This requires:

- Increasing irrigated land from the current 7 per cent (3.6 per cent in sub-Saharan Africa) to at least 10 per cent of arable land;
- Rehabilitating the estimated 500 million hectares of degraded land through soil and water conservation measures;

- Addressing land policy issues, especially security of tenure and equitable land distribution;
- Addressing the root causes of disappearing biodiversity and implementing the recommendations of various conventions that governments have signed in this regard;
- Improving land use by restricting the encroachment of cultivation into fragile ecosystems, rampant urbanization, and inappropriate agricultural practices;
- Improving water management through the protection of water sources, conflict resolution, and enhancement of water utilization systems and quality; and
- Improving human capital stock by providing access to health facilities, basic education and extension services to farmers aimed at promoting sustainable agricultural production.

“ African countries need to encourage private investment in agricultural research ”

Increase funding for agricultural research and technology

Internal and economic rates of return for agricultural research are high at 30-60 per cent for most commodities, and agricultural research also creates welfare gains in the rest of the economy. However, agricultural research continues to be under-funded. African governments need to:

- Increase agricultural research funding from the current average of 0.7 per cent of agricultural GDP to the desired rate of 2 per cent;
- Continuously update research capability in the new areas of biotechnology by providing adequate support to national and regional agricultural research and educational institutions on the continent; and
- Create an enabling environment for private sector participation and funding of research at national and regional levels.

Increase use of yield-enhancing practices and technologies

As Africa lags behind in the use of yield-enhancing technologies, it is recommended that proactive policies be implemented to promote their use as follows:

- Increase fertilizer use from the low levels of 125 gm/ha to at least 500 gm/ha, which is about half of the world average, and increasingly aim to reach the world average;

“
Soil and water
conservation
a prerequisite
for sustainable
agricultural
development
”

- Increase the comparatively low use of tractors, which stands at 13/100 km² in sub-Saharan Africa to at least the level in East Asia of 89/100 km²; and
- Increase the use of improved seeds and livestock to enhance yields and output.

Boost investment in soil and water conservation

Africa accounts for 27 per cent of degraded land in the world. This is mainly due to insecurity of land tenure and lack of aggressive promotion of soil and water conservation measures, despite their proven value. It is recommended that governments should:

- Ensure that national agricultural development strategies place emphasis on soil and water conservation measures rather than on expansion of cultivated land; and
- Create incentives and enabling environments for communities and individual farmers to adopt soil and water conservation measures.

Improve marketing and rural infrastructure

Improved rural infrastructure and marketing are essential for Africa to enhance the competitiveness of its agricultural products. To do so the continent needs to:

- Increase road densities in rural areas from the low level of 31 km/1,000 km² to 134 km/1,000 km², which are comparable to those of other developing regions, in order to lower road freight tariffs, which are five times higher in Africa than elsewhere in the world;
- Increase ICT absorption, especially the mobile density, from 55/1,000 people to the level of 86/1000 people in other developing regions;
- Increase computer connection, especially in rural centres, and lower costs of Internet dial-up service, which are two to three times those of other developing regions;
- Increase electricity coverage from 16 per cent to 41 per cent of the population as in other developing regions, and lower power tariffs to encourage increased use by SMEs, agro-industries and farmers; and
- Improve port handling facilities (both coastal and inland) and simplify customs clearance procedures.

Address the potential adverse impact of bio-fuels

To reduce the potential impact of bio-fuel production on the agricultural output mix and food security in Africa, governments should:

- Promote bio-fuel production only from non-food crop species, such as Jatropha and other species where bio-fuel is manufactured from the by-product, as in the case of sugarcane with its molasses by-product; and
- Design and implement strategies to ensure a careful long-term balance between food security and bio-fuel production.

“
*Promote
biofuel production
only from non-food
crop species*
”

Improve access to education and technical skills development in rural Africa

To increase labour productivity and modernize agriculture, African countries and donors need to work together in order to increase access to education in rural areas in the context of the MDGs. Targeted interventions in this regard should encompass:

- Measures to promote universal primary education in rural areas and ensure gender equality in school enrolment;
- Support to poor households through income transfer, free school feeding programmes and other measures to encourage them to send their children to school; and
- Adapt curricula and provide training courses and extension services to upgrade skills for improved farming practices and use of modern technology in agriculture and related activities.

4.4 Conclusions

After outlining the key challenges to agricultural development and transformation in Africa, this chapter has underscored the urgent need for African governments to take the necessary measures and decisions to implement the continent's long-awaited agricultural transformation agenda.

Agricultural production based on expansion of cultivated areas as practiced in most countries has a limit. Increasing populations and declining land availability call for enhanced productivity and promotion of sustainable agriculture for the continent, in order to avoid an environmental disaster. Already, about 500 million hectares of land are degraded. There is therefore an urgent need for a carefully planned strategy of land reform and land use, which is vital for reversing this trend.

The critical challenge to agricultural development in Africa is the under-capitalization of agriculture in general and agricultural research in particular. African governments should therefore fund agriculture and agricultural research to the agreed levels, in order to achieve the NEPAD-CAADP projected growth rate of 6 per cent per annum by 2015. Their strategies should also include measures to increase the use of yield-enhancing practices and technologies.

Other critical catalysts for the transformation of agriculture are improvement of road densities, adequate financing, ICT infrastructure, rural electrification and promotion of agro-industries and related SMEs. These together with improved port handling facilities and simplification of cross-country customs clearance procedures will promote regional trade.

To more effectively exploit opportunities in regional trade for agricultural transformation and food security, there is need to create an agro-industrial base and integrated value chains to transform bulky commodities into marketable products with a long shelf life. There are ample opportunities for increased value addition in agriculture and regional trade in Africa. These opportunities include large amounts of imported food items that can be produced locally; the existence of large amounts of primary products and raw materials that can be processed in Africa; and increasing urbanization, which translates into growing demand for processed products.

References

African Union, 2003. Maputo Declaration on Food Security. Addis Ababa, Ethiopia.

_____/NEPAD, 2004. Implementing the Comprehensive African Agriculture Development Programme and Restoring Food Security in Africa: the Roadmap. Addis Ababa, Ethiopia.

_____, 2006. Declaration of the Abuja Food Security Summit. 4-7 December, 2006. Abuja, Nigeria.

APN, 2008. Africa's Development: Promises and Prospects. Geneva, Switzerland.

Beintema M.N. and Gert-Jan Stads, 2004. "Sub-Saharan African Agricultural Research: Recent Investment Trends". *Outlook on Agriculture*, Vol. 33, No 4: 239-246.

Byerlee D., 2000. Competitive Funding of Agricultural Research in the World Bank: Lessons and Challenges. World Bank. Washington, DC.

Dione J., 2007. Presentation on climate change, agriculture and food security in Africa. UNECA, Addis Ababa, Ethiopia.

Diouf, J., 1989. *The Challenge of Agricultural Development in Africa*. Sir John Crawford Memorial Lecture. World Bank, Washington D.C.

Ehui S. and E.Tsigas, 2006. *Identifying agricultural research and development investment opportunities in Sub-Sahara Africa: a global, economy-wide analysis*. Paper presented at the International Agricultural Economists Conference. 12-18 August 2006. Queensland, Australia.

ENTRO and East Nile Basin Initiative, 2007. Eastern Nile Water Management Project: Distributive Analysis Final Report. Addis Ababa, Ethiopia.

FAO, 2008. State of Food and Agriculture: World Food and Agriculture in Review. Rome, Italy.

_____, 2007. Food and Agriculture Statistics, Rome. (www.fostat.org).

IFM, 2007. *Competitive economic situations and location of production in the textiles and clothing, footwear and furniture industries*. Paris, France.

IHT, 2008. "Poor Countries Suffer as Funding Dries Up for Agricultural Research", *International Herald Tribune* www.ihf.com/bin/printfriendly.php?id=12991593.

Inisika, A.C, G.C. Ashimogo and J.E.D. Mlangwa, 2005. "From ujamaa to structural adjustment: agricultural intensification in Tanzania". In Djurfeld, G., H. Holmen, M. Jirstrom, and R. Larsson, (eds.) *The African Food Crisis: Lessons from the Asian Green Revolution*. CABI Publishing, UK: 197- 217.

Jaffee S. and J. Morton, 1995. *Marketing Africa's High Value Foods: Comparative Experience of an Emergent Private Sector*. Kendall/Hunt Publishing Company. Dubuque, Iowa, USA.

MOTI/JICA, 2007. *Kenya Industrial Development: Master Plan Study for Kenyan Industrial Development*. Ministry of Trade and Industry, Nairobi, Kenya.

Spielman D., year unknown. Presentation on Capacity Building for Science, Technology and Innovation. www.uneca.org/sciencewithafrica/contents/swa-sti_capacitybuilding-Spielman-en.ppt

UNECA, 2008. Trends in land and labour productivity by regional economic community, Addis Ababa, Ethiopia.

_____, 2007. Trends in Agricultural Production by Country, 1990-2006. UNECA. Addis Ababa, Ethiopia.

_____, 2006. The State and Trends of Agriculture and Rural Transformation 1990-2005,. Addis Ababa, Ethiopia.

_____, 2005. Economic Report on Africa 2005: Meeting the Challenges of Unemployment and Poverty in Africa, Addis Ababa, Ethiopia.

_____, 2002. "Contribution towards the agriculture strategy of the New Partnership for Africa's Development (NEPAD)". UNECA, Addis Ababa, Ethiopia.

Waibel H., 2006. "Impact assessment of agricultural research for development and poverty reduction". Working Paper No. 2 of 2006. Faculty of Development and Agricultural Economics, University of Hanover, Germany.

WFP, 2005. "Report on cost-benefit analysis and impact assessment of soil and water conservation and forestry measures in Ethiopia". Ethiopia.

World Bank, 2008. World Global Monitoring Report, World Bank. Washington, D.C. USA.

_____, 2007. World Development Report 2007. World Bank. Washington, D.C.

_____, 2004. World Development Indicators. Online database. World Bank. Washington, D.C.

Yesuf M., 2007. *Financial and economic analysis of sustainable land management SLM project in Ethiopia*. World Bank/Ministry of Agriculture. Ethiopia.

