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Traditional Agriculture

How can Productivitys be Improved?

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Introduction

One of the most serious post-independence errors of judgement by African nations is the lack of political wisdom to give priority to agriculture and rural development. The needed long-term public sector investments into this key sector are still lacking. This chapter is premised on a perceived need to deal with issues of agricultural development in a broad context. Moreover, issues of smallholder agricultural development can no longer be divorced from issues of democracy, politics and governance on the continent. Global trends now have significant impact on the potential for recovery and growth of African agriculture. In particular are the negative impacts of climate change, the energy crisis and food aid policies which dampen long-term growth prospects. In addition, and central to this chapter, is the need to intensify the search for workable solutions to increasing the productivity and competitiveness of African agriculture.

In 1956, when the wave of political independence started in Africa, the continent was food secure, self-sufficient and, in general, Africa was a net food exporter. Today, Africa is mostly hungry and it is the most food insecure continent in the world, causing a slow-down in productivity and growth. Ironically, governments in rich industrial countries, where farmers are few in number and already

productive, tend to support investments in farming more than governments in poor agricultural countries where hunger persists and productivity is lagging. Sub-Saharan Africa, where 50% of the food insecure are farm households, has not only had slow progress in accelerating agricultural growth but is typically vulnerable to shocks such as conflicts, climate change, high and volatile food prices and financial crises. Agro ecosystems in sub-Saharan Africa are severely constrained by factors such as droughts, poor infrastructure, undeveloped input and output markets, as well as weak governance and institutions.

The importance of developing agriculture in Africa is central because nearly 75% of the population is rural. The social and economic progress of these people is largely dependant on increasing the productivity of agriculture and natural resources. Agriculture is the backbone of the African economy and will continue to be so for the foreseeable future. Even in economies where agriculture contributes single-digit percentage to the gross domestic product (GDP), the performance of the agricultural sector still determines the economic fate of most people and all other sectors continue to depend significantly on the performance of agriculture. Unfortunately, agriculture in most countries on the continent is substantially underperforming relative to its potential. Water control and irrigation management, particularly small-scale water harvesting, irrigation and drainage systems, are critical for averting famines and developing a more productive and competitive agriculture. But in Africa, only 7% of arable land is irrigated, compared to 14% in Latin America and the Caribbean, 38% in East and Southeast Asia, and 42% in South Asia. Fertiliser use in Africa currently amounts to about 9 kg/ha of arable land per year, compared to 120 kg/ha in South Asia. Meanwhile, Africa utilises only 1.6% of its water resources, compared to 14% in Asia. The challenge posed by the HIV/AIDS epidemic is now felt in the rural areas posing a heavy burden on millions of people who are infected and their families, both in terms of their capacity to produce and to buy their food.

Public and private sector investments in the prime movers of agriculture are the primary solution to achieving sustainable improvement in agricultural productivity. The prime movers that require substantial investment to achieve sustainable agricultural development are as follows:

- Investments into land development and improved land tenure systems for land users;
- New technology produced by public and private investments in agricultural research or imported from the global research system and adapted to local conditions;
- Human capital in the form of professional, managerial and technical skills produced by investments in schools, agricultural colleges, faculties of agriculture and on-the-job training and experience;
- Sustained growth of biological capital (genetic and husbandry improvements of crops, livestock and forests) and physical capital investments in dams, wells, irrigation, storage farcicalities, roads, and so on;
- Improvements in the performance of farmer service and support institutions such as marketing, credit, research and extension, and settlement; and
- Favourable economic policy environment and political support for agriculture in the long term.

Significance of agriculture in overall economic development

The agricultural sector in Africa contributes an estimated 35% of the region's gross national product (GNP), employs up to 80% of the total labour force and accounts for up to 40% of the total foreign exchange earnings. The future of Africa is closely intertwined with the development of its agricultural sector. In countries that are not dominated by mining, agriculture is the largest contributor to total foreign exchange earnings. According to an article by C. Peter Timmer in the journal *International Agricultural Development*, general economic

growth has to be preceded or at least accompanied by solid agricultural growth. Agriculture has historically played this central role since the English Agricultural Revolution, which paved the way for the Industrial Revolution. This transformation process still applies today. Africa will not be an exception, neither is it likely that Africa will be able to jump this vital stage of development. The traditional roles of agriculture are essential in overall economic growth and these include:

- Providing adequate and affordable food for increasing populations. The process of industrialisation and urbanisation is more efficient when food is cheaper for the growing industrial labour force;
- Supplying raw materials to grow and diversify domestic industrial sectors;
- Releasing labour for the growing industrial sector;
- Enlarging the size of the effective market for the products of the domestic industrial sector;
- Providing employment and livelihood as well as alleviating poverty for a large percentage of the rural population;
- Earning and saving foreign exchange through exports; and
- Accumulating domestic savings for investment and capital formation.

Timmer (1998) provides a conceptual framework for agricultural and economic transformation which shows four stages of development as follows:

- **Stage one**: Where agriculture has been adequately nurtured and starts growing and creating new wealth at a rate that allows direct and indirect taxation and this feeds into other major public assets and infrastructure.
- **Stage two**: Where agricultural growth becomes a direct contributor to overall economic growth through greater links with the industry, improving efficiency of product and factor markets, and continued mobilisation of rural resources.

- **Stage three**: Where agriculture is fully integrated in the market economy. Prices of food and the share of food in urban budgets continue to decline.
- **Stage four**: Where agriculture is part of an industrial economy. Productivity and efficiency of agriculture is a major issue, and environmental and other concerns assume greater significance.

Africa in general, it would appear, is only entering the first stage of the transformation. Some countries in Asia and Latin America, on the other hand, seem to have entered this first stage with some in the second and third stages. In the 1950s, it could be argued that there was little difference in the level of development among the three regions. As agriculture goes through these stages, its share in the national accounts figures diminishes, and increasingly the population becomes more urbanised. African politicians have unfortunately misinterpreted this as a decline in the importance of agriculture. In reality, agriculture is politically alive in industrial economies; even where farmers and rural people represent only 2–3% of the population, they still command the attention of governments.

One unfortunate situation in Africa today is the premature movement of large numbers of rural people into urban areas. This rural to urban migration is unfortunate and premature because most of these people do not have jobs or homes in the urban-industrial sector. Most do not possess the life and economic skills to be gainfully employed in the urban areas. As a result, urban decay is on the increase in Africa as the over-stretched infrastructure breeds ill-health, crime and social breakdown of family structures. Moreover, the movement is largely by young adults. This drains the rural areas of the young and energetic force that is desperately needed for agricultural development in these areas.

Why the focus on productivity

High and sustained rates of agricultural growth, largely driven by productivity growth, will be necessary if African countries are to

accelerate economic growth. This is because agricultural growth has powerful leverage effects on the rest of the economy, especially in the early stages of development and economic transformation, when agriculture accounts for large shares of national income, employment and foreign trade. The food, agriculture and national resources sector in Africa is strategic to the long-term growth and development of the economies. And since the majority of the estimated half billion African population lives in rural areas, and their livelihood is tied to agriculture directly and/or indirectly, it follows therefore that this sector will continue to be the backbone of the African economies for a few more decades. Agricultural productivity in Africa has hardly increased during the last four decades. Since then, Asia and Latin America have seen yields of staple crops more than double (to about 3 tons/ha in Asia, and about 2.6 in Latin America). In Africa, the yield increases of staple crops have been modest at about 1 ton/ha. In fact, in many rural areas, where 70% of the poorest 1.2 billion in the world live and work, agricultural productivity is declining sharply. Much of this is due to land degradation, decline in soil fertility and climate change.

In many cases, declining agricultural productivity forces people to encroach on forests, grasslands and wetlands, creating a downward spiral of further environmental degradation and poverty. Improving agricultural productivity is thus essential to the sustainable development goal of reducing both poverty and stress on the environment. Problems posed by climate change, droughts and floods contribute to the unsustainable and unproductive use of land resources and, consequently, poverty.

African agriculture has undergone major market reforms and external liberalisation during the past three decades. All in all, however, these reforms have failed to generate sufficient supply responses to enable agriculture to play a central role as a main driver of growth and poverty reduction. Instead, food availability per capita has declined by 3% in sub-Saharan Africa since 1990, in sharp contrast with increases of more than 30% in Asia and 20% in Latin America.

Also, Africa currently imports 25% of its food grains. The poor performance of African agriculture implies that the continent has been lagging behind in adapting to the structural transformation of the international agro-food market which has opened up new business opportunities for developing-country producers, while at the same time increasing competitive pressures. In 2006, the African average cereal yield was only 40% of the Southeast Asian average.

This alone explains the significant difference in overall economic growth, particularly between Asia and Africa. In the fight against poverty, hunger, malnutrition and unemployment, Africa has to get its agriculture moving and focus squarely on productivity and competitiveness. African countries participate in the expansion of world agricultural trade but their contribution is relatively small. Looking at the evolution since the mid-1980s, the share of African products in world agricultural imports has actually declined from 5.4% in 1985 to 3.2% in 2006. Moreover, agricultural exports are highly concentrated in a small number of countries. Africa's share in global trade dropped from 6% in 1980 to about 3% in 2007. Eight of the ten lowest ranked countries on the Global Competitiveness Index are sub-Saharan African.

Around the world, the ratio of arable land to population is steadily declining. Between 1960 and 2000, it declined by about 40%, but in developing nations the decline has been most rapid. In Africa, the ratio of arable land to population declined by 55% in the same period. Over the last three decades, and as discussed later in more detail, productivity increases in agriculture have largely been through increases in area cultivated as opposed to yield. Productivity increases are therefore needed in terms of increases in yield per unit area, as well as per unit of labour. In addition, the costs of production have to decline for a unit of produce. Competitiveness is partly a function of productivity since volume and lower production costs allow for more effective penetration of local and export markets. Competitiveness in terms of efficient and effective supply of local and export markets, however, requires additional capacities and competencies.

The quality of produce at the production end is central for enhancing the product quality, particularly for niche markets. The ability to penetrate and maintain market share requires timely access to knowledge and information on market trends and traits, as well as technology to allow cost-effective production, processing and packaging. Africa has to meet the twin target of getting its agriculture moving, and at the same time integrating the rural with the industrial economy in order to accelerate overall economic growth, incomes, employment and food security.

Recent trends in African agricultural performance

Productivity levels of smallholder agriculture in Africa, in terms of both land and labour productivity, still lag far behind other developing regions. Within Africa, the situation is especially marked in southern and eastern Africa. Low growth rates in cereal yields and production in Africa have translated over the years into falling per-capita food production and increased imports, contributing to high levels of food insecurity at both national and household levels (20% of African cereal consumption depends on imports, including food aid). Much of the growth of output in Africa has been due to expanded use of land, labour and livestock, until the 1990s, when recent estimates imply that productivity growth has played an increasingly larger role. Total factor productivity (TFP) grew at an annual rate of 1.3% on average during the 1990s, accounting for approximately 40% of the 3.1% annual growth in agricultural output.

Growth in the traditional inputs of land, labour and livestock accounted for the other 60% of agricultural output growth. To achieve the desired agricultural growth rate of 6% or more will require TFP growth rates of 4.4% per year. This is because the growth in land and labour inputs are unlikely to continue to grow at the same rate as in the past, and productivity must increase at a faster rate for output to grow. The expansion of the labour force is tied to the demographics of the region and changes in the recent past show a reduction in the growth of labour. While the economically active

population in sub-Saharan Africa increased at an average growth rate of 2.1% during 1981–90, this growth was reduced to 1.9% per year in the 1990s and projected to be even less in the post-2000 era. Current world food price increases, propelled by a mixture of structural and temporary factors, are allied with diminishing food stocks and difficulties in accessing food by some communities, particularly in sub-Saharan Africa. During this same period, the value of food imports into Africa has increased from US$4.2 billion to US$7 billion.

The uniqueness of African agriculture: Issues and challenges for agricultural productivity in Africa

Africa has some unique features that differ from Asia, where the green revolution had a positive impact on productivity. Recognising these is an essential prerequisite to the formulation of strategies and priorities in raising productivity, particularly as far as science and technology are concerned. This is because these features not only present as unique features but are the actual factors affecting the performance of African agriculture. These delineate the options available to science and technology to influence productivity and imply that African agriculture is more likely to experience numerous 'rainbow evolutions' that differ in nature and extent among the many systems, rather than one green revolution as in Asia, where irrigated rice-wheat systems predominated. Because of these features, more investment in agricultural research and development (R&D) per unit of productivity gain will likely be required in Africa as compared to other continents. The unique features of African agricultural systems are as follows:

Diversity of cropping systems

If one drives around in most parts of rural Africa, one notices the many combinations and permutations of various crops. There is also a great diversity of staple crops: maize, sorghum, cassava, plantain, cooking banana, rice, yam, and so on. This means that increasing

productivity requires investment in a lot of different crops. Most staple crops are grown under rain-fed conditions. This differs from Asia where the whole green revolution was based on a few crops, namely rice and wheat, grown mainly under irrigation.

Thin rural infrastructure

Poor infrastructure, especially rural and trunk roads, constitute another significant challenge to agriculture in Africa. While one half of the rural population of South Asia lives within a one-hour journey of a market, nearly 50% of African farmers still live five hours or more from a market. Not only are there few rural roads, but transport costs in Africa are among the highest in the world, reaching as much as 77% of the value of exports. Poor infrastructure and information leave farmers effectively isolated from regional or international markets.

Undeveloped markets

The commodity market structure is generally characterised by a lack of market linkages. There is a lack of functioning competitive markets as a result of low purchasing power in domestic markets and poor access to global markets due to trade distortions such as agricultural subsidies in rich countries. This means limited opportunities for adding value by post-harvest processing and high post-harvest losses, which are estimated at 30% for grains and 50% for other more rapidly perishable products. Where opportunities exist, farmers can rarely take advantage of them because they are not empowered or sufficiently informed.

Minimal mechanisation

Smallholder farmers in Africa still rely on manual labour. The productivity of agriculture will therefore benefit from access by these small farmers to appropriate machinery that reduces the drudgery of labour and that can be manufactured locally and made available at reasonable prices.

Limited seasonal financing

Rural financial markets are under-developed in Africa and this reduces the capacity to finance their seasonal expenses.

Competition with food aid

Often food aid over time increases the dependency of rural households; in addition food aid can dampen local markets leading to poor prices and reduced local incentives to produce.

Dominance of weathered and inherently infertile soils

Environmental degradation affects soil nutrient depletion, soil erosion and the destruction of water catchment areas and salination. The soils of the continent's vast land surface are typically old and leached; 16% of the surface land is classified as very low in nutrients as opposed to just 4% in Asia. An estimated 65% of sub-Saharan Africa's agricultural land is degraded as a result of water and soil erosion and chemical degradation. African soils are estimated to be losing nutrients worth US$4 billion per annum. Yet farmers use fertiliser at a rate of only about 8 kg/ha and less in smallholder farming, compared to a target of 50 kg/ha. This may not be surprising, given the cost that sub-Saharan African farmers must pay for fertiliser, which is up to three times that paid by their counterparts in Brazil, India or Thailand.

Weak agricultural support systems

There is an under-investment in R&D and infrastructure which leads to a lack of conducive economic and political enabling environments, inadequate manpower and poor skills for planning, policy formulation and analysis. In addition, poor budgetary outlays for programme implementation and monitoring and evaluation all contribute to this situation. Limited government capacity, especially where centralised government dominates, leads to unclear or inadequate sector policies and strategies with respect to identifying proper sequencing development priorities.

Poor agricultural policies

There are trade-off between present-day political gains versus long-term development policies in Africa.

Solutions for African agriculture's productivity challenge: An elaboration to the prime movers

Favourable policy environment and political will

The single most important step in getting agriculture moving in Africa is generating greater political commitment to this sector by politicians, parliamentarians, policy-makers and ministries of planning and ministries of finance. Greater fiscal commitment to agriculture will provide a more conducive policy environment. This will create the appropriate environment for long-term and sustainable investments, particularly from the private sector. Macroeconomic stability and favourable pricing and marketing policies are crucial for providing the necessary incentives for generating a supply response.

Of particular importance and practical significance in the creation of a favourable policy environment for agriculture is the strengthening of governance and institutions. In a 2009 report, the Food and Agriculture Organization (FAO) notes that in the 1960s and 1970s, support to small farmers through the provision of inputs, the purchase of their output, credit and extension services were provided by public institutions and national marketing boards. In the 1980s, in line with market liberalisation policy and as part of the structural adjustment programmes, these institutions were weakened and in some cases even dismantled. Yet, no effective and consistent policies or continuous operational programmes were adopted and implemented to ensure their replacement with adequate private or semi-private institutions to continue to provide the same services to small farmers. It has become clear today that small farmers need public policy and institutional support to enable them to organise themselves to collect information, improve their production and benefit from economies of scale in input access and product marketing.

Realigning of institutions serving farmers and agriculture

Realigning of Africa's farmer-support systems that include extension/ training, research, credit and private-sector supply of inputs for smallholders is critical for raising agricultural productivity in Africa. Donor-initiated economic policy reforms have failed to achieve the desired increase in aggregate agricultural output in many countries in Africa. There is now ample evidence that these reforms must be complemented by indigenous efforts to revitalise farmer-support institutions. There is also a growing awareness that an array of public and private institutional models is needed, particularly because of the uniqueness and peculiarities associated with the African situation outlined in preceding sections.

There is a need for financial intermediation through bridging savings and credit. Public sector credit programmes have collapsed in Africa and the commercial banks have not really moved into rural areas to service that market. The debate on farm credit in Africa therefore joins the traditional debate around micro-finance for rural small and medium enterprises. Too little capital is flowing into the rural areas and micro-enterprises, and micro-finance initiatives cannot fill the gap. In addition, micro-finance is largely subsidised by other institutions and unsustainable. Micro-finance efforts are disconnected from the mainstream money markets. Mainstream money markets are conservative and reluctant to learn new rules and values in working with poor people and communities. Africa needs functional rural financial markets capable of both savings and investment financing. The focus has to shift toward holistic 'financial intermediation'. This implies a shift from subsidised programmes to self-financing programmes.

Resolving security of land tenure and property-rights issues

Land-tenure rights of people is an issue that is assuming greater significance in every African country, and will increase in the twenty-first century. African governments have to appreciate that transforming agrarian systems into urban-industrial economies

invariably requires fundamental changes in many institutions, including those of land tenure. The distribution of land ownership is a major factor that influences this transition from one form of social and political order to another. Barrington Moore in *Social Origins of Dictatorship and Democracy* sums up the experience of all industrialising countries in the separation of a substantial segment of the ruling classes from direct ties to the land. There is growing evidence that agricultural growth and efficient management of natural resources are dependent on the political, legal and administrative capabilities of rural communities to determine their own future and to protect their land and land-based natural resources and other economic interests. The lack of this power (or lack of democracy) is translated into insecure tenure rights, abuse of common property and resources, disenfranchisement of rural people, particularly women, and the breakdown or weakening of rural economic institutions. The management of the environment and the effectiveness of community-based natural resource management are all dependant on clearly defined land rights and support systems for rural communities.

Natural resources managed as common property now face severe degradation in most African countries. When local institutions are unable to resolve conflicts over the use of common resources, governments often make the mistake of assuming direct control and administration of these resources. In some instances, the government is simply interested in exploiting the resources to the exclusion of local communities, as is sometimes the case with wildlife and national parks. The deprived communities often lose interest in protecting the natural resources and may actually contribute to unauthorised exploitation and poaching. For resources under common usage, governments should shift towards a policy that employs a transparent decision-making process to control access to natural resources. Meaningful community governance is possible mainly where political power and fiscal responsibility are decentralised to institutions that represent local stakeholders. In practice, however, two widespread policies inadvertently undermine indigenous tenure systems.

- **Unregistered land is state land**: Most prevalent is the practice that all land with no registered title is state land. According to the book *Searching for Land Tenure Security in Africa*, the reality, however, is that the majority of Africans continue to believe in and hold their land under indigenous customary tenure systems, irrespective of the formal legal position under national law. Organs of central government are generally inappropriate for local administration and management of land tenure, and invariably undermine the local and traditional institutions. Moreover, this leads to corrupt practices by influential politicians and bureaucrats. Although governments acknowledge this de facto prevalence of customary tenure, they continue to maintain the *de jure* state ownership. In this situation, land conflicts escalate, and traditional conflict resolution mechanisms are rendered ineffective.
- **Common land is private land**: The second practice is the attempt to replace customary land tenure with state-imposed individual property rights to land and resources. This change is assumed to be more compatible with the protection and sustainable exploitation of natural resources, as well as the intensification and commercialisation of agriculture. There is mounting evidence, however, that land titling and registration programmes have not yielded positive benefits. Moreover, formal title has not necessarily increased tenure security, according to the authors in an article in the leading *American Journal of Agricultural Economics*.

The weakness of government institutions in Africa leave these state-imposed individualised tenurial systems in a vulnerable position. State-imposed tenure systems are often based on European or North American legal and administrative codes. A host of institutions is required for this tenurial system – and soon. These types of institutions, including surveyors, courts of law, legal practitioners, police

and banks, are generally absent in rural Africa. African customary laws and values that guide tenure policies also differ or even conflict with the alien ones. Where the state imposes alien tenure systems, conflicts often arise in the interpretation of these at customary level. Examples include differences in values surrounding group versus individual rights and inheritance and succession.

Mandivamba Rukuni, chairman of the Commission of Inquiry into Appropriate Agricultural Land Tenure Systems, claims that these practices are so debilitating that in Zimbabwe, for example, highly centralised systems of government were judged as the most serious threat to tenure security for land users under all types of tenure. This problem is most acute for communally held land and state land occupied by communities under customary rights. Communities occupying such land have limited exclusive rights because bureaucrats and politicians also claim institutional authority over the land. In the worst case, these state functionaries may be the de facto landlords.

Tenure security

Traditional African land tenure systems have all the key ingredients of secure tenure. Land tenure security can generally be defined as the certainty of continuous use, and is associated with four sets of rights:

- **Use rights**: rights to grow crops, trees, make permanent improvement, harvest trees and fruits, and so on;
- **Transfer rights**: rights to sell, give, mortgage, lease, rent or bequeath;
- **Exclusion rights**: rights to exclude others from using or transferring; and
- **Enforcement rights**: refer to the legal, institutional and administrative provisions to guarantee use, transfer and exclusion rights.

Who enforces rights?

According to Gershon Feder and David Feeny, in an article in the *World Bank Economic Review*, these four property rights define the legitimate uses and users of land in a given period. Rights may be subdivided almost infinitely. In parts of Africa and South Asia (as was the case in medieval England), rights to the crop are private whereas rights to the stubble after harvesting are communal. Similarly, in some parts of Africa, land and tree tenure are not held by individuals. Rather, they are defined at community level. Economist John Taylor claims that rights may be enforced by formal institutions or informal customs, beliefs and attitudes. Enforcement often requires a buttress of instruments such as courts, police, banks, lawyers, surveys and valuation and record-keeping systems.

Who enjoys rights?

All tenure systems fall into four broad categories of ownership: open access, communal, private and state (see Table 9.1). In most countries, few areas are truly open access; some land may appear open, but usually it is state or communal land over which the state or community lacks adequate enforcement capacity, or such capacity comes under pressure. The result is insecurity of tenure, manifested in land-use patterns that mimic open-access systems.

Exclusivity defines the degree of tenure security. Under communal tenure, exclusive-use rights are assigned to a group. Individual- or family-use rights are also assigned under most traditional tenure systems.

Table 9.1 Categories of land tenure systems.

Category	Ownership of Exclusive Rights
Open access	None
Communal	Defined group
Private	Individual legal entity
State	Public sector

Private property rights are the most prevalent form of tenure in industrialised Western countries. Many Africans view these rights as a creation of the state, not as God-given or sacred rights. The experience in Africa has therefore been that where private property rights are not viewed as legitimate, or not generally viewed as working in the public interest, or where they are simply not enforced adequately, they become quite insecure. In extreme cases, *de jure* private property can deteriorate into de facto open access. In the *World Bank Economic Review*, Shem Migot-Adholla and fellow authors have argued that communal tenure in indigenous African land rights systems do not necessarily conflict with Western property rights systems. Holding exclusive-use rights in traditional tenure systems can be as secure as private property rights in Western industrialised countries.

There is no tenure system that is good or bad, right or wrong. Most important is a tenure system that is secure, appropriate and able to facilitate the needs of a community or society. At issue is who confers the rights. Where freehold rights are assigned to a family or an individual by the community under the traditional tenure system, these rights can be very secure.

Contrary to popular belief by Western scholars and observers, traditional systems of tenure are quite secure, and do not necessarily constrain productivity and conservation. A growing body of research on tenure demonstrates that the most important characteristic of tenure security under indigenous systems is the ability to bequeath land. Authors Frank Place, Mark Roth and Peter Hazell examined existing studies by the World Bank and the Land Tenure Centre, and also researched a number of African countries, to produce a comparative analysis of Burkina Faso, Ghana, Kenya, Rwanda, Senegal, Somalia and Uganda. This analysis confirmed that indigenous systems do not hinder productivity or investment. In addition, land registration has not necessarily led to tenure security. Recent research also demonstrates that the high productivity increases enjoyed by smallholders in Kenya and Zimbabwe had, and still have,

less to do with individual tenure, than with the removal of prohibitions and other bottlenecks for smallholders that were more important than land tenure changes. Government intervention makes sense, therefore, only after the causes of tenure insecurity and the bottlenecks to rural development have been identified.

Research has also exposed two other economic fallacies associated with state-imposed individual tenure reforms. First is the fallacy of economies of scale in agricultural production. Worldwide evidence shows no real scale economies, and, if anything, small farms can be even more efficient than large farms. The second fallacy is the view by governments that the practice by African farmers of holding multiple parcels of land in separate locations is not efficient. Once again, evidence is showing great wisdom in the holding of multiple parcels of varying suitability for the wide spectrum of crops grown. These two fallacies lead governments into pursuing policies of consolidating holdings rather than subdividing land.

Investment in social capital and physical infrastructure

Compared to other regions of the developing world, much of rural Africa is characterised by a dispersed rural population and low population densities, according to researchers Sudhir Wanmali and Yassir Islam. The centre-periphery model described by John Friedman in *Regional Development Policy* is characterised as a colonial relationship in which the principal factors of production, including raw materials and agricultural goods, are drawn from the periphery 'rural' to the centre 'urban' where they are used to produce higher valued manufactured goods. Over time, infrastructure is concentrated in urban areas and availability declines in rural areas. Researchers Dunstan Spencer and Ousmane Badiane claim that rural roads in Africa today are less developed than they were in India at the beginning of the green revolution. A puzzling question, for instance, is why Africa, in spite of recurring droughts, has not developed innovative and locally appropriate means of small-scale irrigation

that supports rain-fed agriculture. The irrigation infrastructure in Africa is thin and its role in a future agricultural revolution, albeit small in area, can be significant in terms of productivity increases, diversifying crops into higher value ones and supplying lucrative markets at their time of shortage. As explained in earlier sections, improvements in infrastructure represent one single area where huge benefits in African agricultural productivity could be reaped.

Improvements in technology to transform traditional agriculture

Most National Agricultural Research Systems (NARSs) in sub-Saharan Africa are having difficulty in producing a steady stream of new technologies for small-scale farms and in generating adequate financial support from their governments. The experiences to date have shown that there is no blueprint for reforming NARSs in Africa. Donors can assist the reform process by supporting local initiatives to craft smallholder-driven research systems that are staffed with accountable scientists who are adequately financed from local sources. According to a 1998 article in *World Development*, since independence in most African countries, agricultural institutions have been in transition. Since independence, African research managers have been forced to grapple simultaneously with five complex transitions which ultimately will influence the productivity and competitiveness of African agriculture:

- Managerial transition from colonial to local administrators;
- Scientific transition from expatriate to indigenous scientists;
- Financial transition from dependence on financial support from colonial governments and large-scale farms to mobilising support from governments and donors;
- Political transition from commercial farms to smallholders in dual agrarian societies; and
- Transition from public to private institutional forms and new forms of public/private/NGO partnerships.

African R&D systems have performed better with 'disembodied' technology in terms of improved management and husbandry recommendations for cropping livestock. Successes with 'embodied' technology are rare because of the limited capacity to manufacture. R&D and industrial capacity is needed for the manufacture of 'embodied' technology such as machinery, seeds, fertilisers, chemicals and materials. Disembodied technology, by contrast, refers to knowledge, techniques and management practices that increase productivity and are largely transmitted through extension and advisory services. Energy and power for smallholder farmers is a major drawback to productivity. The continued decline in draught animals, coupled with a lack of appropriate small machinery, means that farmers yields are held back. Since most of the increase in production is from new areas opened up, as opposed to technological breakthroughs, this means greater pressure on the environment.

Promotion of traditional principles of agriculture

Traditional principles of agriculture, such as preservation of the gene pool, practicing holistic resource management, inter-cropping, use of organic fertilisers, integrated pest control, conservation agriculture, agro-forestry, etc., which ancestors understood without science or formal education, need to be promoted. Africa is a de facto organic continent and African farmers need to exploit the growing international markets for organic products, including vegetables, flowers and herbs.

The principles of agricultural renaissance also provide a useful guide on how African governments should intervene in their agricultural sectors. These principles include:

1) Promotion of small family farms
2) Regarding farming as a:
   - Tradition: Knowledge and skills passed on to next generations
   - Business: To create rural wealth
   - Way of life: Custodian of culture and the environment
3) Promoting integrated crop and livestock management

Commercialisation of smallholder agriculture through value-chain development

Value-chain development should be based on the small family farms in line with the principles of agricultural renaissance explained above. Family farming units can be intensively trained in the technical aspects of production, value addition, entrepreneurship, wealth creation and basic value chain management. The process of wealth creation at community level does not necessarily depend on formal education but involves:

1) Building physical and biological assets:
   - Improved quality of trees, herbs, animals, etc.
   - Roads, wells, grain bins, improved houses
2) Circulating local products and services:
   - Family businesses
   - Using extended family as business model
   - Localising exchange of goods and services
3) Promoting the value of self-employment:
   - Starting own business and projects
   - Refusing to work for someone else after a certain age
4) Bequeathing life and survival skills to the youth:
   - Food production and preservation
   - Home improvement
   - Project management
5) Transmuting problems and challenges to business opportunities:
   - Cultural industries and cottage industries as lucrative businesses in future

All this requires building the spirit of entrepreneurship and this does not hinge on formal education but involves being equipped with skills in:

- Seeing opportunities where others do not
- Having the courage to act
- Having the courage to do things that have never been done before
- Having courage to be innovative and creative

Make trade open, transparent and fair for African smallholder farmers

National governments should eliminate existing harmful trade restrictions and refrain from newly imposed ones in order to reduce food price volatility and enhance the efficiency of agricultural markets. In addition, transparent, fair and open global trade should be ensured. In 2009 the FAO reiterated that a rules-based international agricultural trading system that is open, non-distorted, non-discriminatory, equitable and fair can promote agricultural and rural development and contribute to world food security.

Agriculture accounts for 11% of the value of all world exports. According to the FAO in 2002, the measures and strategies that would ensure that the poorest and most vulnerable countries and population groups receive an equitable share of the benefits of trade liberalisation should be aimed at:

- Eliminating direct and indirect export subsidies;
- Rationalising and simplifying access to the Organization for Economic Cooperation and Development (OECD) markets. Specifically, rationalise and simplify trade preferences, assist countries whose preferences have been eroded through multilateral liberalisation and deepen existing preferences for very poor countries;
- Reducing OECD tariffs and consumer taxes on processed agricultural products, with special preferences for products from developing countries;
- Eliminating tariff escalation for tropical commodities in the developing as well as the developed countries. Tariffs are rising even faster in the former than in the latter group. The purchasing power of China's or India's rapidly growing middle class could turn these countries into major importers of some tropical agricultural products over the next 30 years; and
- Creating or expanding safety nets and food distribution schemes to ensure that low-income consumers are not penalised by rises in the price of food imports.

Integrate climate change into strategies at all levels

Climate change affects agriculture directly through changes in agro-ecological conditions and indirectly by affecting growth and distribution of incomes, and thus demand for agricultural produce. Changes in temperature and precipitation associated with continued emissions of greenhouse gases will bring changes in land suitability and crop yields. To reduce the vulnerability of poor people to climate change and moderate the impact of climate change, a combination of adaptation and mitigation strategies is needed at the global, regional, national, basin and local level. Options for climate change adaptation in agriculture include improved land management, adjustment of planting dates and introduction of new crop varieties, while the mitigation options include improved energy efficiency and crop yields, and land management techniques to increase carbon storage. In particular, community-based adaptation strategies that strengthen the community's capacity to cope with disasters, enhance land-management skills and diversify livelihoods should be supported.

Conclusion

The needed long-term public sector investments into this key sector are still lacking and there is a need for a major improvement in the political and fiscal commitment of governments to agriculture. The importance of developing agriculture in Africa is central because the majority of Africans are rural. The social and economic progress of these people is largely dependent on increasing the productivity of agriculture and natural resources. Agriculture is the backbone of the African economy and will continue to be so for the foreseeable future. Africa's agriculture is unique in terms of the diversity of cropping systems; thin rural infrastructure; undeveloped markets; minimal mechanisation; limited seasonal financing; competition with food aid; dominance of weathered and inherently infertile soils; weak agricultural support systems and poor agricultural policies. The prime movers that require substantial investment to achieve sustainable

agricultural development include: investments into land development and improved land tenure systems; new technology produced by public and private investments in agricultural research; professional, managerial and technical skills produced by investments in the right educational systems; sustained growth of biological capital and physical capital investments; improvements in the performance of farmer service and support institutions; and, more importantly, a favourable economic policy environment and political support for agriculture over the long term.

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