

# From Food Insecurity to Food Sovereignty in Africa

**Megatrends, Driving Forces, Action Levers**

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## **Summary**

*Feeding 1.5 billion and then two billion Africans in 2030 and 2050 respectively is a challenge that the continent has the capacity to meet. But for this, the food sovereignty strategy must guide public policies.*

*The consequences of the Covid-19 pandemic, such as the impact of Russian intervention in Ukraine on agricultural markets, accentuate the challenge of reconfiguring agricultural policies in the direction of strengthening capable local and regional supply chains. to meet needs.*

*Acting to conquer the continent's food sovereignty amounts to resolving the following equation: how to respond to growing and evolving food demand, under the constraint of strong land limits, on often degraded land, while preserving the environment and without increasing the rate of dependence on imports? The answer: produce, market and transform more and differently.*

*Two actors, women seeking autonomy and young people seeking integration, will play the leading roles in the transformation of peasant realities.*

*Even if agriculture will remain mainly based on the peasant economy, agripreneurship will develop around medium-sized farms with diversified technical itineraries.*

*Intensification will remain unavoidable due to multiple land boundaries. It will be reasoned and ecological to fight against soil degradation. It will have to be done on the basis of the mobilization of new techniques, the abundance of which is impressive, whether these relate to inputs, productive routes or transformation, but also on the inclusion of endogenous knowledge and local resources. The digital revolution is underway across a very broad spectrum of activities.*

*A growing fraction of agriculture will be driven by the growth of cities. Agri-food systems will be increasingly intertwined and territorialized. Understanding this reality and the organic links that are formed on local value chains is already a source of gains (limiting post-harvest losses) and significant innovations.*

*As food demand evolves significantly with urbanization, processing and marketing units will play an increasing role in the endogenization of agri-food systems, with a propensity to promote "local consumption".*

*The territory will consolidate its place in public policies. It is the place where instabilities arising from price volatility, financing and guarantee systems can be managed. It must be protected in a selective and transitory manner. Betting on the region will open up growth prospects that are already perceptible.*

*The total value of investments needed each year for the continent's agriculture and food systems will range between \$15 billion and \$77 billion for the public sector alone.*

*Finally, the parameters of structural transformation are within the reach of those in power. As long as they establish overall coherence, allow the multitude of emerging innovations to unfold and facilitate their appropriation by the various actors of the transformation and their scaling up to guarantee their irreversibility and create lasting resilience.*

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Two recent events have worsened poverty, the root cause of food insecurity in Africa. They have reversed two decades of progress, worsened malnutrition and revealed the great vulnerabilities of national response systems to critical situations.

The Covid-19 pandemic, with the mobility restriction measures that were adopted, illustrated the structural deficiencies of agri-food systems. Access to inputs – seeds, fertilizers – and small equipment has been very disrupted, but the health crisis has affected agricultural production capacities less than the general organization of value chains. The pandemic and its consequences have highlighted the serious failures in the connection between local production and the downstream value chains, up to the consumption of the most precarious.

When Russia's attempted invasion of Ukraine began in March 2022, almost all African countries (46 out of 54) were net food importers. Among them, dependence on grain imports was over 40%, with half of them coming largely from Russia and Ukraine. Cereal prices have soared, creating severe difficulties in large-consuming and low-producing countries: Ethiopia, Sudan, Nigeria, Senegal, Ivory Coast, Congo, Gabon, Botswana, etc. The increase in fertilizer prices has also caused pose a serious threat to food security. Prices have doubled, and even tripled in some markets.

The challenge for the future remains the same as before these two tragedies: in 2050, Africa will have to satisfy a food demand that will be double what it is today. To meet this challenge, the concept of *food sovereignty* is put forward in the vast majority of States. It's not new. In 1996, at the World Food Summit in Rome, the international peasant movement, *Via Campesina*, introduced its definition: "*Food sovereignty is the right of each country to maintain and develop its own capacity to produce its own food, an essential factor in food security at national and community level, while respecting cultural and agricultural diversity* . This concept is widely adopted today.

African heads of state make it the cornerstone of the African Union strategy, as in their Dakar Declaration on food sovereignty and resilience (Dakar 2 ) of January 27, 2023. During the African Union-European Union ministerial conference on June 30, 2023 in Rome, the *African civil organizations society and people's movements which brought together 134 national and regional organizations took up the same demand in their declaration* . The inalienable right to food sovereignty appears in the Constitutions of Egypt and Niger..., in legislative texts of Burkina Faso, Cape Verde, Mali, Senegal... in the United Nations Declaration on the Rights of Peasants and other people working in rural areas (2018), in the texts of the FAO, IFAD, WFP, the World Bank...

Food sovereignty encompasses the notion of *food security* which prioritizes access, availability and quality of food, and gives it an operational dimension (how to achieve it), territorial (if possible everywhere in the country or region), political (on an independent basis) and legal (with one right for all).

Behind food sovereignty lies the idea of the structural transformation of agricultural and food systems which encompass all essential elements and activities, from inputs to pre-production, from agricultural production and supply chains to retail, environmental food and food consumption. It takes into account drivers of food system change such as environmental factors, policies, markets and demographic, social and cultural trends.

It cannot be obtained without deviating from its path the agricultural trajectory traced in Africa for decades. It will take a disruption in management practices for water, soil, seeds, nutrients and other resources to boost production and the adaptability of agriculture, fishing and livestock.

In order to contribute to this reflection, this document is organized around five groups of questions:

- What are the major trends likely to continue and which will shape the future of agri-food systems?
- What are the seeds of change likely to influence the major trends affecting agri-food systems?
- What are the potentially most dynamic agents likely to drive long-term development?
- With what technical options?
- With what levers of action to mitigate vulnerabilities to the various shocks (climate, health, security, etc.) that agri-food systems will experience?

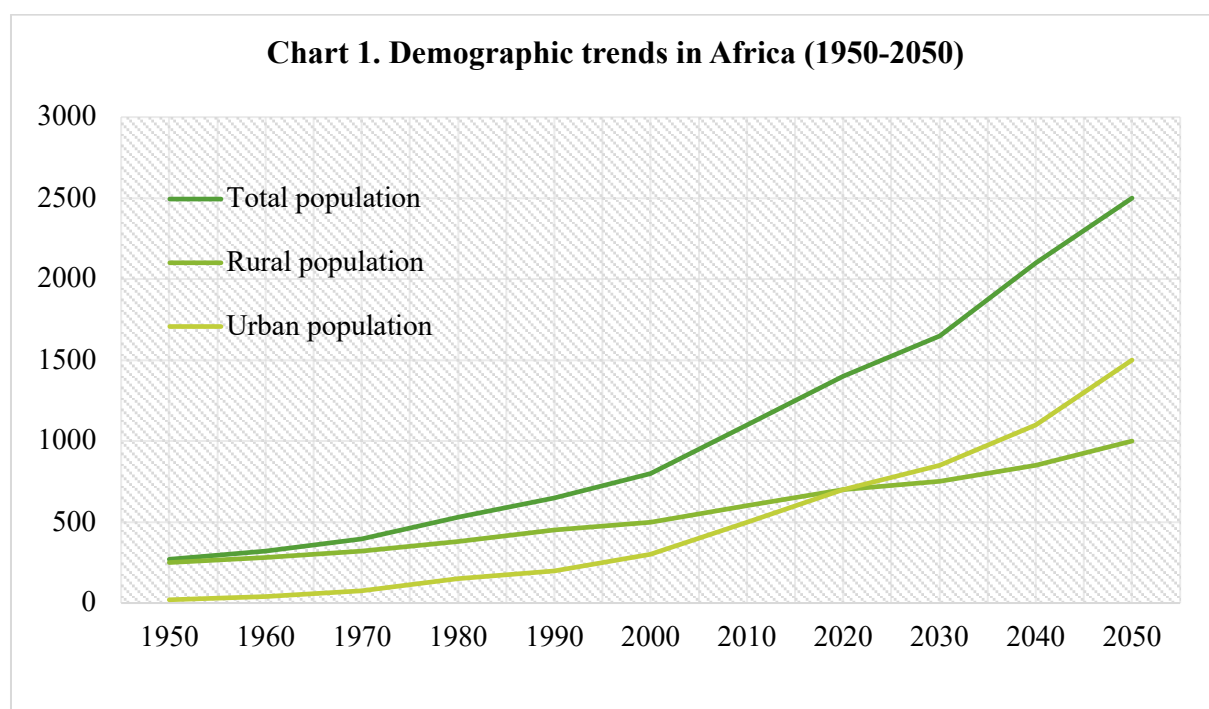
A preliminary precaution is necessary. It is imposed on the basis of a reality: Africa is plural. All actors are not locked in the same way within the constraints of their ecosystem and inserted in the same way into the market system. There is nothing comparable between the Africa of the argan and olive trees of Morocco, the Africa of the granaries and the daba of Burkina Faso, the Africa of the banana trees and euphorbias of the Great Lakes, the 'Africa of the broad irrigated plains of Egypt or that of the Malagasy rice fields... On this observation of diversity, the analysis of agricultural systems and poverty proposed by the FAO and the World Bank focuses on the endowment of resources and the provision of services (essential services, access to markets) to lead to the existence of fifteen large systems in sub-Saharan Africa and eight systems in North Africa. Each of these systems includes millions of agricultural households with contrasting levels of resources, access to services and coping strategies.

Faced with such variegated and complex realities, the approach that we suggest is to highlight the heterogeneity and richness of practices, the multiple and sometimes paradoxical character of the logics which govern the action of actors, even if the exercise synthesis sometimes requires a certain form of generalization.

# 1. Opposing megatrends

Africa is today facing a major demographic challenge. According to United Nations projections, the continent is expected to double its population by 2050, from 1.2 billion people today to nearly 2.5 billion in 2050. These figures hide very different situations. Some countries made their demographic transition, such as Morocco and Tunisia in the 1960s, and Algeria, South Africa and Rwanda afterwards. But other populations will experience significant growth in the coming decades, such as in Nigeria, the Sahel, Somalia and the Democratic Republic of Congo.

Demographic dynamics will reshape the organization of the population, with the growth of cities, offering increasing outlets for rural producers. However, and this is an African exception, the rural population will continue to grow in absolute value, since it will include around 250 million additional people. In reality, with the densification of environments, the boundaries between rural and urban will become blurred. New territories have already emerged on the outskirts of metropolises and major roads, connecting capitals to a string of small towns. Large-scale migrations are to be expected from this exceptional demographic growth and the spatial inequalities of development which will widen.



Source, UNDESA, *World Population Prospects*.

What are the slow but crucial changes that can fundamentally affect the conditions, outcomes and behavior of food systems? Some trends are inevitable; others will be able to activate both positive and negative medium-term effects.



## *Food insecurity that affects a quarter of Africans*

The two recent food crises, that of 2007-2008 and that of 2020-2023, are not of the same nature. The first was initially a supply crisis with strong restrictions on the availability of food goods (fall in production, drop in imports, retention of stocks) and also "panic buying", with a powerful impact on the increase in prices. The second is rather a demand crisis, associated with falling incomes and consumers' lack of purchasing power, but without a major break in supply chains and without a significant increase in prices. Stocks were generally sufficient.

The current upheavals experienced in agricultural markets are not the only reason for the vulnerabilities that negatively affect all African food systems. The precariousness of urban and rural households, the impacts of climate change as well as local or regional conflicts are all elements of a structural nature which also pre-existed the pandemic and the war in Ukraine.

The proportion of the population suffering from hunger is much higher in Africa than in other regions of the world — almost 20%, compared to 8.5% in Asia, 6.5% in Latin America and the West Indies and 7.0% in Oceania (FAO, 2023).

Food insecurity indicators are established from household surveys in order to detect periods of food restriction or deprivation, going so far as to endanger people's health. *Moderate* insecurity manifests itself in skipped meals or reduced quantities ingested due to a lack of resources, while *severe insecurity* results in entire days without eating due to lack of food reserves.

The data comes from international (World Bank, FAO, WFP, IFAD) and regional (ADB) institutions and is supported by the main indicators available: the Global Food Security Index from The Economist Intelligence Unit, the *Food Systems Index* from the University of Wageningen, the *NGI Food System Index* from New Growth Initiative and the *Food Systems Dashboard and Typology* from GAIN and Johns Hopkins University.

After a period of improvement between 2000 and 2013, the situation subsequently gradually worsened. In 2023, around 322 million Africans, or nearly a quarter of the population, will suffer from severe food insecurity and a further 473 million from moderate forms, for a population of more than 1.2 billion people on the continent. . And 77% of Africans could not afford to eat healthily (FAO, 2023).

Several factors now combine: droughts, floods, locust epidemics, instability of international and regional markets, conflicts and physical insecurity of populations. In the Horn of Africa, four deficit seasons in a row threatened more than 15 million people with famine in Somalia, Ethiopia and Kenya at the start of 2023 .

Behind the dramatic events lies the main cause of undernourishment, in Africa as in the rest of the world, namely poverty. Poor households who buy their food, particularly in cities, face particularly high food costs . The Cost of a Healthy Diet ( CoHD) is \$3.57 per person per day; it is on average more expensive (in purchasing power parity) than in North America and Europe , where the average expenditure is equivalent to \$3.22 (FAO, 2023). Vegetables and animal foods account for the largest share of the total cost of a healthy diet. Two other food groups account for a significant portion of this total cost: fruits (17%) and starchy foods (17%). Finally, the two food groups contributing the least are legumes, nuts and seeds (6%) and oils and fats (5%).

The minimum spending basket (MEB for *Minimum Expenditure Basket*), defined as what a household needs to meet its basic needs is inaccessible to 70% of Malawians who consume meals based mainly on inexpensive and low-nutrition cereals. Similarly, in Rwanda, a third of the population is undernourished and 20% overweight or obese. A nutrient-adequate diet can only be achieved by half the population. In Ghana, a nutrient-adequate diet is unaffordable for 27% of the population. Nutritionally, 6.5% of Ghanaians are undernourished. This rather good

performance compared to that prevailing elsewhere in Africa is attributed to the school feeding programs that the country has implemented over the years (AASR, 2022).

### ***Types of shocks at the source of food crises in Africa***

Shocks linked to natural hazards

– *large-scale production shocks, more or less strongly associated with market failures, which can cause food crises*

*Important;*

– *localized disasters (such as floods, droughts, locust attacks), leading their victims into situations of temporary but acute dependence.*

Health shocks

– *exceptional health disasters (Ebola, Covid-19, avian flu), the management of which has an impact on production and marketing.*

Shocks linked to price changes

– *significant price increases on the markets or disruptions in market supplies, whatever the causes (localized or generalized production deficit, political tensions, behavior of operators, panic buying);*

– *strong price variations on international markets;*

“Political” shocks induced by socio-political crises and conflicts

– *Insecurity hindering mobility or causing forced displacement.*

## ***Malnutrition, the sneaky disease***

Many countries face what is known as the “triple burden of malnutrition”, with populations suffering not only from being underweight and micronutrient deficiencies, but also, increasingly, from being overweight.

*Deficiency malnutrition* occurs when the intake of vitamins and minerals or trace elements (such as vitamin A, zinc, iodine or iron) is not sufficient to ensure good health and development. There are multiple factors contributing to micronutrient deficiencies : poor diet, increased unmet micronutrient needs during certain periods of life such as pregnancy or breastfeeding, or even health problems (diseases, infections, parasites). But starchy commodities make up the largest share of the African food supply. Animal-based food components in the continent's food supply are generally lower (247 g/capita/day) than the EAT-Lancet diet recommendation of 334 g/capita/day. The predominance of starchy and animal foods, as well as fruits and vegetables, is responsible for the high number of micronutrient deficiencies.

Malnutrition is by nature multidimensional, the nutritional status of children being determined by multiple factors, primarily the poverty of households, which are unable to access healthy, affordable and diversified food, a high prevalence of childhood diseases , insufficient access to basic social services, particularly drinking water and sanitation. The low diversity of diets is often worrying. Less than one adolescent in five benefits from minimal dietary diversity in Burkina Faso and Niger. In these two countries, as well as in Mali, one in two women suffer from anemia and at least a third of children under 5 suffer from chronic malnutrition (UNICEF, 2023).

Particularly in the Sahel countries, malnutrition has a lasting impact on the development of young children and their mothers. CILSS (2023) estimates that around 12.25 million children under 5 years of age suffered from acute malnutrition (AGM) in 2023 in eight countries in the Sahel region. Among these children, 3.4 million were victims of severe acute malnutrition (SAM), the most serious form, putting them at major risk of mortality.

Malnutrition is transgenerational. It harms fetal development and subsequently generates irreversible effects on the growth and learning of children. Efforts to prevent stunting are known to be most effective in the 1,000 days between conception and a child's second birthday. Quality manufactured fortified foods have a strong potential to prevent malnutrition in young children and their mothers, by providing nutritional value adapted to their needs. It is possible to manufacture local infant flour whose quality meets international standards. In Burkina Faso, GRET's experience of street sales of ready-to-eat porridge in vulnerable neighborhoods demonstrated that quality products could remain accessible, provided the marketing strategy was adapted (the service offered, the packaging, the price), etc.) and to raise awareness among families of the nutritional needs of their children.

### *Pejorative climatic circumstances*

Today, 460 million people (36% of the African population) are exposed to at least one form of climate risk, such as drought, heat, water stress or flooding. By 2050, this number is expected to almost double to 900 million people (45% of the continent's population) under a 2°C warming scenario. Large parts of Africa could face a loss of labor productivity linked to the risk of reductions in effective working hours due to increased heat and humidity (Bouchene et al, 2021; ILRI, 2022).

Climate change will bring unprecedented effects.

Models from the Intergovernmental Panel on Climate Change (IPCC) predict negative consequences for most of the continent's agriculture. It is likely that the worsening of global warming will sometimes intensify phenomena of drought (in the Sudano-Sahelian zone and in the southwest of southern Africa), sometimes of heavy precipitation (in the coastal regions or in the highlands of Ethiopia). Increased exposure to flooding will increase losses and damage, particularly in small river basins that are densely populated and prone to flash flooding. Areas that are suitable for a given crop today will change as local climates change.

The El Niño phenomenon, which returns irregularly and lasts several months, will have varied effects on the different sub-regions of the continent. West and Southern Africa (including island economies) typically experience dry weather during El Niño. Water shortages associated with droughts would create risks of water shortages leading to rationing and straining the supply of electricity in countries heavily dependent on hydropower, which would have a negative impact on all companies operating in the affected areas. El Niño usually brings heavy rainfall to East Africa, but as it is an extreme weather phenomenon, it is possible that rainfall will be excessive. Flash floods and related problems disrupt road networks and access to markets.

The United Nations Environment Program (UNEP) *Africa's Adaptation Gap reports that warming of around 2°C would result in a 10% reduction in total agricultural yield in sub-Saharan Africa by 2050*; further warming could increase this figure to 15 or 20%. For maize alone, the drop in yields would be around 30 to 40% in West Africa. Increases in temperature can also be expected to have a significant impact on product quality by changing important parameters, such as the synthesis of sugars, organic acids, antioxidant compounds, and product firmness.

Livestock production is expected to be affected by changes in feed quality and availability, water availability, and increased rates of disease and heat stress. Fishing yields are also expected to decline in rivers and lakes as well as offshore. Fish productivity in lakes is also expected to decline with increasing water temperature, high levels of evaporation, and decreased nutrient concentration due to reduced inputs.

During the droughts of 1973-1973 and 1983-1984, the 100 mm isohyet, which corresponds to the dry limit of the Sahel, moved back 400 km further south in certain seasons. The irreversibility of desertification in the region is however called into question. The arrival of satellite

remote sensing provided a valuable tool, particularly thanks to vegetation indices which made it possible to carry out the first monitoring on a global scale. The regreening of herbaceous and, to a lesser degree, woody covers, initiated since the early 1990s (the “return of the green Sahel”), as observed by increasingly precise satellite data, would be undeniable in tropical zone, except in a few localized pockets in Sudan, northern Nigeria, and Niger (Descroix, 2021). Opposite trends are, however, observed in the Maghreb. The only certainty is that the fringes between the Sahara and the Sahel remain very fragile, due to human and animal overload with ecological irreversibility effects.

In total, a rise in temperatures of more than 2.5°C would cause a population displacement of 56 to 86 million people on the continent, due to reduced yields, water shortages and even flooding (IPCC, 2022). Let us recognize that there is great uncertainty about the extent and exact nature of climate impacts on agriculture. We could just as well observe positive reactions in certain regions. In certain high altitude areas, the cold is currently a limiting factor for crops. Madagascar, for example, could see its rice production in the highlands increase thanks to the heat. Placed in identical growth conditions (particularly in terms of access to water and nutrients), plant species give responses that differ in particular when faced with CO<sub>2</sub> concentration. In the Maghreb, for wheat, rice, soya and barley, for example, the potentially positive effect of a high CO<sub>2</sub> concentration on yield would compensate for the negative effects of the two other factors (temperatures and precipitation); but not in sub-Saharan Africa. For plants like corn and sorghum, however, the potential effect of CO<sub>2</sub> concentration would remain insufficiently high everywhere to avoid reductions in yields for this type of plant.

What is certain is that the climate will force Africa to invent a new agronomy. But climate doesn't explain everything. Anthropogenic action amplifies that of nature. Other factors come into play. A drought functions as a indicator which only causes famine when there is a combination of dysfunctions: organizational deficits, lack of storage capacity and transport logistics, political unrest, conflicts and civil wars. A *double incapacity* manifests itself: *physical* (real access to food) and *economic* (real capacity to acquire it). Numerous illustrations support this thesis.

### *Limited availability of new land*

Population growth has changed the structures of pastoral areas. Clearing continued to the detriment of forest areas and grazing areas. Like what happened between 1995 and 2016, since cultivated land in sub-Saharan Africa then increased from 155 million to 240 million hectares. In West Africa, they have doubled since 1975; the settlement area has increased by around 150%. The agricultural pioneer front advances irremediably and increasingly colonizes pastoral lands.

The thesis, according to which Africa has a large availability of land for cultivation, is put forward by numerous international and regional institutions. However, the reality is more complex. The apparent non-use of land does not mean its full availability for viable agriculture. In the dominant perception of “empty Africa”, ecological constraints are always underestimated, even though they significantly reduce the scale of real availability.

With a total of 2,456 million hectares, sub-Saharan Africa is vast. The areas considered useful, that is to say virtually capable of being devoted to an economic activity, whatever it may be, cover nearly 1537 million hectares of this whole, after withdrawal of continental waters, land considered uncultivated because affected by desertification and inhabited settlement areas, cities, transport routes, etc. Some countries are particularly rich in potentially arable land. Out of 97 million hectares of useful agricultural land in South Africa, less than 13% is cultivated. The ratios are similar in other countries with abundant land, in Madagascar, Sudan, Mozambique and the Democratic Republic of Congo. To obtain the potential, it is necessary to

remove forests (677 million hectares) and protected areas (155 million hectares), recognized for their ecological value. Ecological constraints are often underestimated, even though they significantly reduce the scale of availability. Here we find the Anglo-Saxon distinction between *availabilities* and *sustainabilities* .

**Table 1. Available useful, potential, exploited and unexploited (in millions of ha)**

Total surface area of sub-Saharan Africa	2,456
<i>Continental waters</i>	-65
<i>Settlement areas</i>	-3
<i>Wasteland</i>	-856
<b>Balance 1: Available useful</b>	<b>1,532</b>
<i>Forests</i>	-677
<i>Protected areas</i>	-155
<b>Balance 2: Potential available</b>	<b>790*</b>
<i>Areas already exploited</i>	-240
<i>Permanent meadows and pastures</i>	-445
<b>Balance 3: Available unexploited</b>	<b>105</b>

\*The sources are as follows: for uncultivated areas: *FAO Food insecurity, Poverty and Environmental Global GIS database* ; for pasture areas: *FAO-Grassland statistical data* ; for forests: *FAO Global Forest Resources Assessments* ; for protected areas: *IUCN and Word data on protected areas* ; for settlement areas: *MODIS 500-m Map of global Urban Expert; Riegel et al., 2019*).

*The net exploitable balance is approximately 100 million hectares* . The precision of the data is relative, but one conclusion seems obvious: there is always substantially less viable land availability than is most often asserted once all the constraints and trade-offs to be made between various functions are taken into account. .

Due to the growth of the rural population, the surface area available per agricultural worker could increase from an average of just over one hectare to around 0.7 ha per individual. With very different situations depending on the country, with availability in 2050 which would vary from around 28 ha in South Africa to less than 0.2 ha in Rwanda and Burundi, if we were to limit agriculture to areas outside forests and protected spaces. In certain arid zones combining the pressure of climate change on their cultivated areas and strong demographic pressure, such as in Niger, Burkina Faso or Malawi, the surface area cultivated per worker would be reduced to around 0.6 ha.

### ***Loss of fertility for half of cultivated areas***

“The floors are no longer responding!” » they sometimes say in Africa.

Fertile soil is soil that has a diversity of living organisms that can contribute to the biological regulation of the agricultural ecosystem . It provides essential elements (mainly nitrogen, phosphorus and potassium) for plant growth through the action of living organisms (animals, insects, earthworms, fungi, parasites) having complex interrelationships and which feed on plant debris or animals. These organisms collaborate in the degradation of organic matter, which causes the release of nutrients essential to the plant.

The continent is said to have lost 650,000 km<sup>2</sup> of fertile land in fifty years. In some of the most sensitive parts of Africa, the rainfall deficit recorded over long periods has destroyed and continues to destroy the root system of savannah plants and trees which hold the soil together and causes aeolian sand to settle. The soil, less protected, is subject to the mechanical action of precipitation which causes a modification of surface conditions and the progressive destruction of the soil. A spiral of degradation is recorded. The plant cover thins out, biomass production decreases. Gold without cover, natural or cultivated, the soil dries out.

The land degradation observed by remote sensing and satellite imagery is hardly questionable. It is estimated that 70 to 80% of the continent's cultivated areas are degraded and show losses of 30 to 60 kg of nutrients per hectare per year (AGNES, 2020). The 2019 IPCC report, devoted to climate-soil relations, is also particularly alarmist: 46% of African land suffers from degradation, which could affect the living conditions of 485 million people.

Serious ecological fragilities explain this phenomenon: losses by erosion, soil salinization, leaching of nutrients, accelerated mineralization, export of plant biomass, risks of invasion by predators, recurrent plant diseases. Soil organic matter (SOM) levels are often very low.

Arid and semi-arid areas, such as the Sudano-Sahelian region, are the most affected. The loss of organic matter and the conversion of rare wetlands into arable land accelerate the acidification of the environment, and desertification and rising temperatures increase the speed of carbon mineralization in the soil. Regions with high human densities (Kenyan Rift Valley, Ethiopian highlands, Great Lakes regions, Malagasy highlands, southern Africa from Cape Town to Maputo) are also threatened as much as sparsely populated areas. For their part, the irrigated regions, which represent around 58% of the cultivated area in Africa, are not faring much better, even if the question of soil degradation arises differently there: the significant rainfall they receive causes flooding, especially when the soil has little vegetation cover. The resulting water erosion mainly concerns Central Africa where the annual erosivity index is very high.

Acidic soils occupy 15% of the total land area, and the problem is growing in both area and severity (Zingore *et al.*, 2023). Acidic soils are mainly found in these humid regions. Heavy rains cause nutrient leaching and chemical alteration of the soil. Soil acidity is severe in areas where annual precipitation exceeds evapotranspiration and is a major cause of low agricultural productivity. In Malawi and Zambia, chemical soil degradation has led to a 15% loss of arable land over the past 10 years. In Burkina Faso and Gabon, it has been demonstrated that ferruginous and ferrallitic soils suffer from acidification after approximately 4 to 7 years of continuous operation. As a result the Positive effects expected from the use of improved seeds tend to be reduced because plants cannot benefit from the technological package (seeds and fertilizers) on depleted soils.

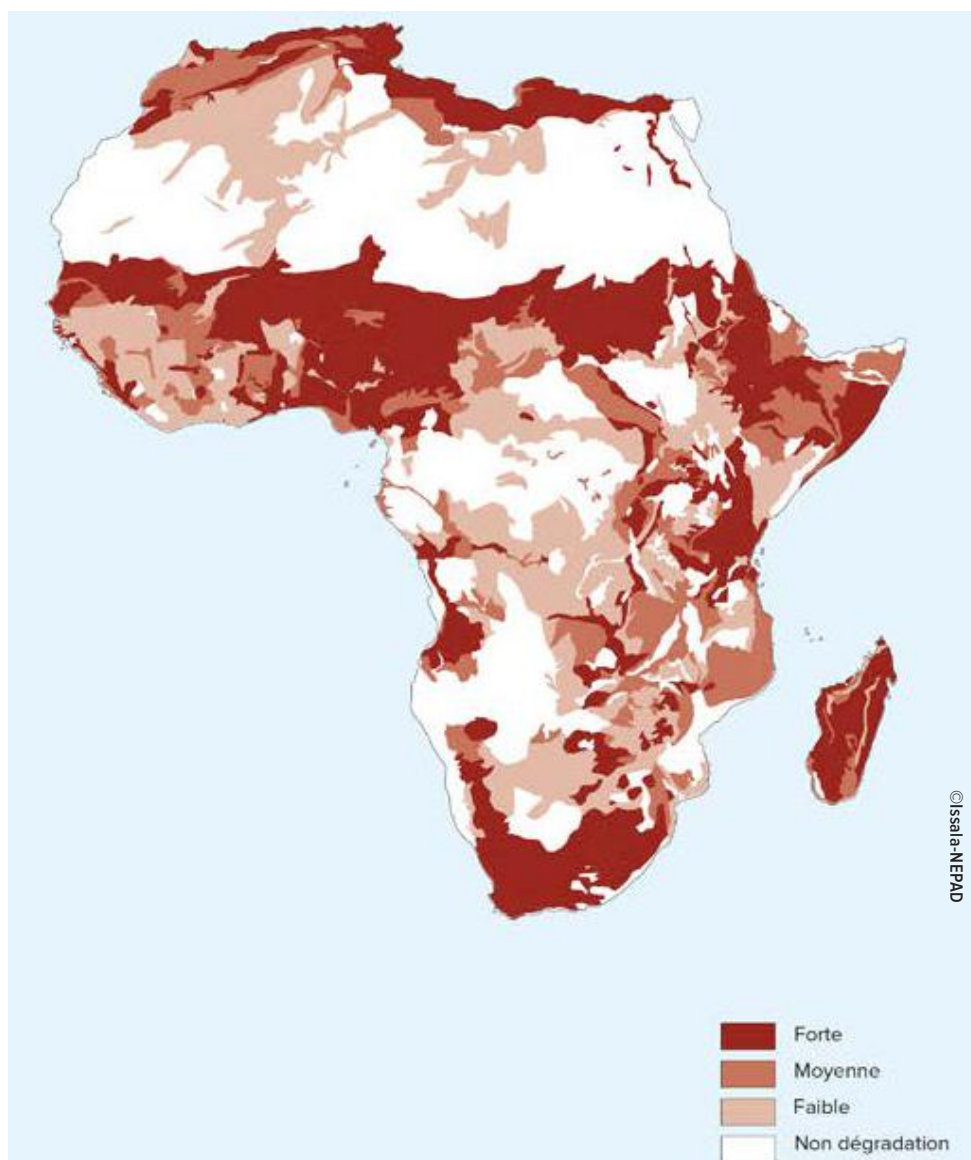
Cultivation practices have their responsibilities. Poor agricultural practices exacerbate the processes of soil erosion, salinization and acidification. Fallow land is disappearing massively in densely populated areas. The proportion of fallow land in relation to total agricultural land in Africa has decreased from 40% in 1960 to around 10% in 2022. This pattern of uninterrupted exploitation would not pose a problem if accompanied by a learning methods for improving soil fertility. Continuous land use and lack of crop rotation deplete soil organic carbon resources, which then become less responsive to fertilizer applications.

This catastrophic diagnosis is not valid everywhere, particularly where farmers know how to preserve and enrich the soil without resorting to aggressive techniques and organize their crops to obtain grains, tubers or vegetables in difficult conditions. But overall, there is a fear that the natural environment will no longer receive as much as it gives and that it will degrade in a looping process.

In total, we can conclude that more than half of the area available for agriculture on the African continent would be affected by these processes of land degradation, thus seriously penalizing yields (IFAD, 2019).

This means that the real availability still unexploited, and likely to be exploited in environmentally sustainable conditions (by preserving forests, meadows and habitats of ecological value) and with yields greater than an acceptable minimum, for crops of at least one of the following products: wheat, corn, cassava, cotton, peanuts, cocoa, coffee, tea, palm oil, soya, rapeseed, fruits, vegetables, sugar and agrofuels, would be approximately 105 million, but of the order of 50 million ha.

**Map 1. Land degradation**



Source, UNEP (Nairobi)

### *Low yields*

The yields of the main cereal crops are stagnating on average at less than 25% of their yield potential. It is estimated that over the past 30 years, on approximately 200 million hectares of cultivated land in 37 African countries, soil fertility depletion per hectare has averaged 660 kg of nitrogen, 75 kg of phosphorus and 450 kg of potassium (AGRA, 2023). In the intensively cultivated highlands of East Africa, crop nutrient extraction, leaching and inadequate erosion controls cause about 36 kg to be lost from each hectare. of nitrogen, 5 kg of phosphorus and 25 kg of potassium per year.

This situation is attributed to the low use of organic and mineral fertilizers on soils that are often very poor in nutrients, particularly nitrogen, in contexts where climate variability is characterized by droughts, cyclones and frequent floods. Pest invasions (desert locust, fall

armyworm, etc.) and cross-border diseases (pest of small ruminants, etc.) are also among the recognized causes of low agricultural productivity.

Analysis of agricultural yield gaps reveals that those of the majority of agricultural products in Africa are significantly lower than the world average. Currently, the production of a well-managed West African dairy cow is around 500-1,000 liters per year, where a Norman cow produces around 6,700 liters and an Israeli or Saudi cow will produce 12,000 liters (AGRA, 2023). For cereals, it is common to observe a difference of 1 to 4.5. Productivity of fruit crops (around 5 tonnes per hectare) in East Africa, the coastal countries of West Africa and Central Africa is only about half of the international average. With yields per hectare of around 5.5 tonnes to 7 tonnes, the productivity of market gardening in the coastal countries of West Africa in Eastern and Central Africa is also much lower than the world average (FAO, 2022).

### *Strong land constraints*

And that's without taking into account the social and legal constraints that weigh on unexploited land. It is estimated that in sub-Saharan Africa, less than 5% of land is registered in land registers or officially recognized by certificates or land titles. Others may appear free, but without really being free. Non-use for economic purposes or observed underutilization does not mean full availability. "Vacant" is a joke of legal language because it actually means "populated, but by occupants without formal titles."

Rights to land are made up of a combination of three main characteristics: the possibility given to use its resources (soil, plants, animals, water, subsoil), the capacity to manage the space concerned (modalities of access and development, methods of exploitation and development), finally the possibility of assigning or transferring all or part of it, in different forms (transmission, alienation, sale, inheritance, sharecropping, tenancy). This results in situations encountered in very complex terrain. Hybridization reigns in this area in Africa as in others. Inherited uses, enshrined in customary and ancestral rights, often overlooked in agricultural statistics, but still alive in the countryside, are essential to the reproduction of the peasant economy, in arid zones as well as in humid zones. Even when the land is nationalized and belongs to the State, on more or less large parts of the territories, local companies still retain a certain autonomy in the last instance. Land availability being linked to the type of agreement that can exist between social practices and norms, it is therefore a variable notion both in time and space, but also depending on the status of the actors (men, women, elders, cadets, indigenous, non-indigenous) and institutions (State, public authorities, private sector, communities, etc.).

Outside of the Sahara, in the heart of the Congolese basin, there are in reality in Africa almost no spaces void of rights, even in apparently available areas and in the large arid zones. They are almost always the subject of specific rights and uses, originally built around the lineage, from the successive clearings of descendants. This results in very complex situations encountered in the field. Complex does not, however, mean without order. On the contrary, a precise distribution of land functions is established to which farmers still often refer to guarantee their land and food security.

Not everything *available that can be exploited is therefore likely to be exploited*. Strong development constraints may exist for reasons other than agronomic ones. They are not perceptible on a map taken from a geospatial observation, however detailed it may be. Understanding it requires looking "inside" at African agrarian realities and the history of the land. However, the previous data includes lands which are used by populations for their survival (gathering, harvesting firewood, hunting), community forests or even areas reserved for ancestral rites which must obviously be excluded under risk of putting the general ecosystem of the territories concerned in a critical situation.



**Table 2. Constraints for making new agricultural land available**

Social	Political, administrative	Economical	Physical
<ul style="list-style-type: none"> <li>– Existence of land reserves for social or religious purposes</li> <li>– Community forests</li> <li>– Permanence of restrictive customary regimes</li> <li>– Reserved areas of pastures or rangelands</li> </ul>	<ul style="list-style-type: none"> <li>– Political limits on access to land</li> <li>– Existence of unresolved land disputes</li> <li>– Classified forests</li> <li>– Protected areas</li> <li>– Permanence of insecurity</li> </ul>	<ul style="list-style-type: none"> <li>– High development costs linked to the regeneration of degraded soils</li> <li>– High costs of access to water</li> <li>– High costs linked to the spatial fragmentation of plots</li> </ul>	<ul style="list-style-type: none"> <li>– Risks of erosion, flooding or drought</li> <li>– Phytopathological constraints</li> <li>– Land unsuitable for cultivation or with too low yields</li> <li>– Threats of peri-urban rights-of-way</li> </ul>

### *Considerable post-harvest losses*

The yield is often said to be "in harvest", it then excludes losses at the edge of the field, those during transfer to the farm then to the market and unusable parts of products. From cereals to fruits and vegetables, the problem of post-harvest losses (PPR) arises everywhere with a certain acuteness. They represent 37% of the continent's production. A colossal figure (Mballo, 2020). In Nigeria, half of the roots and tubers and even more of the fruit and vegetable production are lost due to poor storage practices.

PPRs can occur at each link in the value chain, during harvesting operations due to the use of poor technique which damages the product or during storage, due to inappropriate storage conditions (high level of humidity, exposure to excessive temperature, poor ventilation of warehouses, risk of parasitic infestations).

In sub-Saharan Africa, the loss of animal products and nearly 50% of roots, tubers, fruits and vegetables is estimated at nearly 30% due to lack of a reliable cold chain. Significant differences exist between countries: cold storage capacity increasing from 2 liters per inhabitant in urban areas of Ethiopia to 15 liters per inhabitant in South Africa compared to around 200 liters for developed countries (, FAO, 2022). Markets are impacted by a faulty or non-existent cold chain. Unable to maintain their production, many farmers are forced to sell excess production at low prices on saturated markets.

### *Risks of depletion of fishery resources*

A study by the International Union for Conservation of Nature (IUCN) on fish stocks in the waters of Africa, from Mauritania to Angola, estimates that 51 species, most of them essential for food coastal populations, are endangered. Artisanal fishing faces various difficulties which hinder its development. FAO data clarifies the situation . On the west coast, there is a reduction in catch per unit effort (CPUE) of several species (particularly groupers, sea bream, rays and sharks) and a reduction in catch size. It is vulnerable to resource depletion (such as the collapse of stocks of the white grouper, the *thiof*, in Senegal). In the South Atlantic, the threat concerns hake and pilchard which support the region's main fisheries. Sardinella stocks, which are very important off the coast of Angola, have maintained a biologically acceptable level, while horse mackerel continues to be the subject of overexploitation. Finally, stocks of abalone, temperate zone shellfish, favored targets of illegal fishing, are deteriorating. In total, only two-thirds of the stocks assessed on the Atlantic coast are at a biologically sustainable level.

In Senegal, fisheries resources are in the process of being exhausted. Overfishing, according to the UNEP, was caused by government aid put in place since the 1980s: absence of taxes on

outboard motors and fishing gear, fuel subsidies, etc. These subsidies were a decisive factor in the modernization of artisanal fishing equipment, favoring the use of more powerful engines and the opening of new operating areas. However, artisanal fishermen continue to face developments that they cannot control, including marine pollution. They have little or no access to credit and insurance. They suffer losses due to cold chain and product processing failures. Health safety problems are often not resolved while standards are becoming more and more rigorous.

But the greatest danger threatening artisanal fishing remains that posed by industrial fishing, often foreign, European, Russian and Asian, legal or illegal. According to estimates from the *FishSpektrum* data center, a platform specializing in ship identification, China alone has a fleet of six hundred boats scattered along the coasts, from Gibraltar to Cape Town. This form of fishing, which has developed greatly since the countries of the North and Asia exhausted the fish reserves in their own geographical areas, constitutes direct competition for artisanal fishing to the extent that it often takes place near of the coasts, in areas traditionally reserved for artisanal fishermen. It therefore exploits the same species (shrimp in Guinea-Bissau, Senegal or Madagascar, yellowfin tuna in Cape Verde, bonito in Seychelles). In addition, the coexistence of these two types of fishing sometimes leads to the destruction of the canoes and nets of artisanal fishermen. At the end of the chain, an entire activity is dying for lack of fish: fish scalers and fish smokers, canoe builders, mechanics, sellers... And of course fishermen. Conflicts between industrial and artisanal fleets are inevitably frequent. If the solution seems simple (introduce, for example, zones separating the use of various equipment when stocks are not moving), the application is often problematic.

### *Risks of farmer-breeder tensions*

Most of Africa's arid and semi-arid ecosystems are mainly dedicated to different types of extensive livestock farming. These systems occupy an essential place in the valorization of spaces and natural resources. In addition to feeding humans and animals, pastoralism provides subsistence income to populations who could not otherwise survive in these regions. Pastoralism is estimated to be the primary livelihood for around 268 million people (according to FAO, 2022).

Itinerant livestock farming has been threatened for several years. It is very marginal in the Maghreb, where in Morocco it only concerns 25,000 pastors. In almost all of the continent's agropastoral zones, agricultural frontiers are advancing and encroaching on rangelands. The monetization of access to drinking water and the taxation of access for transhumant livestock generate multiple pejorative consequences: decapitalization of livestock, increased conflicts between users of rural areas and dissolution of social ties between communities. Frictions are amplified by ambient insecurity, banditry and armed conflicts such as in the Sahel, northern Nigeria, Lake Chad, Darfur, the Horn of Africa or the Great Lakes.

The “pastoralists / farmers conflict” leads to reductive analyzes of the complexity of the dynamics at work in many regions. Friction and violence are the results of a multidimensional crisis in the governance of rural areas against the backdrop of climate change which is affecting living conditions.

Traditionally, transhumant pastoralists enjoy a cooperative relationship with sedentary farmers where arable land is used for agriculture during the rainy season and animal grazing during the dry season. For several years, recurring droughts on grazing lands have encouraged pastoral groups to migrate to agricultural land before the harvest and exacerbate competition over increasingly scarce resources (water, land).



*Fulani shepherds and their livestock at the end of the rainy season in western Mali,  
© Leif Brottem.*

Mobile pastoralists often find themselves in positions of political or economic vulnerability—whether due to historical neglect, the need to move into insecure spaces, or the need to access resources through secondary rights — and this vulnerability has often been exploited by both abusive authorities and non-state armed groups. These experiences may inspire some to participate in criminal and insurgent activities or pressure pastoralists to protect themselves in ways that contribute to the conflict (for example, by forming self-defense groups or shifting movements to new zones).

The security crisis is taking a heavy toll on pastoralists. But for many analysts, solutions exist. The question is how to untangle and redress the adverse dynamics, by translating the recognition of the rights and interests of pastoralists into texts and facts, by ensuring their integration into local and national institutional and economic structures in order to extinguish their sentiment of exclusion and marginalization.

### *Decoupled logistical constraints*

The close links between improving the connectivity of rural roads, roads and transport on the one hand, and reducing poverty and food insecurity on the other are established. However, the poor quality of transport infrastructure in Africa represents 40% of logistics costs for coastal countries and 60% for landlocked countries.

Currently, Africa is the region in the world with the lowest density of road and rail networks, but highest maintenance costs. Tarmac roads in particular are rare compared to the size of the continent. The land and sea transport challenges are even greater for the 16 landlocked African countries. Logistics Performance Index (LPI) from the Turku School of Economics, which is based on surveys of operators to assess the efficiency of logistics infrastructure, gives sub-Saharan Africa one of the lowest scores (2.87 out of 5) and the shortest delivery times. high for both imports and exports.

The initial stage in transporting crops, from the collection point to secondary roads, is the most expensive. First mile transport charges can amount to more than a fifth of the total cost in the relevant transport chain. A study in Nyeri, Kenya, showed that the cost of transporting onions the first two kilometers represented about 10 to 20 percent of the net income farmers

would earn from selling their produce. Due to the difficulty of using trucks on poor quality roads near farms, products must be transported by intermediate means of transport ((MTI), i.e. on the backs of men ( or women), by motorcycles or animal-drawn carts. They provide farmers with a useful form of transport for agricultural products, particularly where loading volumes are low and access to roads is limited. However, the cost per ton-km of MIT is significantly higher than the automobile vehicle. The study demonstrated that these modes of transport, per ton-km, cost 16 to 30 times more than transport by truck (Research for Community Access Partnership-RECAP , 2022). “Mixed” transport services combining passenger and goods transport in vans, minibuses and buses have been established in rural areas. These services are extremely important for small farmers who have little access to freight transport, reserved for more influential producers carrying larger costs.

The case of Madagascar is the most emblematic. Road density is only 5.4 km per 100 km<sup>2</sup>, and most national and local roads are dirt and in poor condition. Only 11% of roads are in good condition. A muddy road marked by giant potholes can cripple cars for days. Many crops lose their value due to driving and transporting over rough tracks and roads. The rural accessibility index (measured by the share of the rural population that lives less than 2 km from an all-season road) is 11.4%, among the lowest in the world, meaning that 17 million Malagasy rural residents are not connected. In addition, the country, and in particular its road infrastructure, is very vulnerable to cyclones. Launched in 2019, a Transport Connectivity Support Project financed by the World Bank involves the rehabilitation of 150 km on two main roads and 500 km of local roads near the two roads to ensure last mile access to neighboring villages. Once completed, the project is expected to reduce travel time between Fort-Dauphin and Vangaindrano from 24 hours to 8 hours. This project also includes the establishment of digital information kiosks along main roads to provide farmers with real-time access to market prices and demand.

### *Chronic underfunding*

African agriculture suffers from an endemic financing gap. This situation is one of the main obstacles to the growth of the agricultural sector. Only 10% of producers, generally those included in cash value chains, have access to credit. Direct financing of rural activities has always been generally considered costly and risky, and for this reason it has remained very limited.

While financial products and systems have improved in many urban areas of the South, their availability lags significantly in rural regions. Money goes to money, little to work or land! It does not flow the most into the sectors and regions where it is rarest. As a result, they focus more on profitable export production (cotton, coffee, cocoa, rubber, etc.), abandoning domestic food crops, which are nevertheless in search of funds. The financing disparities, already marked in the past, are exacerbated and the overall increase in financing amounts is accompanied by the concentration of these for the benefit of entrepreneurial agriculture, with high added value and more rarely towards family farming, public goods and isolated areas.

IFAD's comparative survey of 200 institutions across twelve African, Asian and Pacific countries is particularly informative (IFAD, Safin and FO4ACP, 2023). The type of financier and the actual obtaining of financing is visible by comparison between continents. Thus, in Asia, 90% of farmers' organizations obtained their funding from official institutions. Their counterparts in West Africa are only 12% to have received financing following requests submitted to local and informal lenders. IFAD estimates that less than one in ten farmers have access to financing in rural Africa when they belong to the poorest segment. On the African continent, the difficulty of accessing financing is due to the high level of credit rates and guarantees. Next comes the applicant's ability to complete application files or pay bank charges.

Despite the importance of women in the organization of agricultural operations, their presence within African farmers' organizations tends to reduce access to financing for cooperative structures. In Asia, the phenomenon is reversed; organizations with a strong female presence obtain higher amounts of funding. Youth also constitutes a barrier to financing. The same obstacles exist for members who wish to borrow from their supervisory organization. Indeed, peasant organizations themselves expect guarantees to minimize their risk. The requests mainly relate to a need for working capital. African farmer organizations express complementary needs, such as loans for fixed assets and marketing financing. They mainly intervene for emergency loans. In West Africa, given the difficulty of accessing financing, applicants are multiplying their sources. In addition to formal establishments (banks, microfinance, government funds, external funds), there are informal providers, local lenders, NGOs, etc. In East and South Africa, government funding represents the majority source (78%), but access to this funding requires formal procedures that are less accessible to smaller organizations.

In 2003, at the African Union Summit held in Maputo, Mozambique, heads of state and government signed the Comprehensive African Agricultural Development Program (CAADP), committing to invest a minimum of 10% of their budget in agriculture and to increase annual agricultural production by 6%. This initiative, commonly known as *the Maputo Declaration*, is the main instrument that leaders put in place at the launch of the *Comprehensive Program for African Agricultural Development (CAADP)* to achieve an annual agricultural growth rate of 6%. . This commitment has remained unchanged over time and has formed the basis of successive AU declarations on agriculture-led development, such as the 2014 *Malabo Declaration* on Accelerating Growth and Transformation of agriculture for shared prosperity and improved livelihoods. Two decades after Maputo, very few countries have reached the 10% target. Only four AU member states (Burundi, DR Congo, Ethiopia and Mali) have met the commitment to devote 10% of their national budget to agriculture. On average, most African governments devote less than 5% of their annual budget to agriculture, while the minimum commitment is 10% (African Union, 2022). Agriculture's share of the continent's total public spending has steadily declined over time, from around 7% per year on average in the 1980s to less than 3% per year on average over the past decade. . Regarding the indicator on smallholder farmers/rural households' access to financial services and their use in agricultural transactions, the results suggest poor performance: only seven countries (Eswatini, Mauritius, Morocco, Nigeria, Seychelles, Tunisia and Zimbabwe) were on track for access to agricultural services. Only sixteen countries scored 30% or more on this indicator.

Certainly the numerical objective of 10% may seem arbitrary. However, given that public spending on agriculture has a high return in terms of economic growth and that agricultural growth has been more effective in reducing poverty than growth from other sectors, the continued decline in the share of agriculture in total public expenditure in Africa is indeed worrying. Agriculture's contribution to gross domestic product has remained around 15% on average on the continent since the 1980s, while in addition to ensuring food security, the sector is supposed to tackle malnutrition, reducing poverty and building resilience, among other outcomes, while addressing challenges such as climate change, degradation of natural resources and the spread of pests and diseases.

There is much to be done in terms of allocation of financing resources, because until now we have observed a gap between declarations and facts. The contribution of the agricultural sector to GDP on the continent reaches 20 to 40%, while the percentage of loans allocated to agriculture by commercial banks amounts to only 3% in Ghana and Kenya, 4% in Uganda, 8% in Mozambique, up to 12% in Tanzania (Source, MFW4A, 2023).

The current architecture of agricultural finance is often structurally incapable of supporting small-scale investment opportunities. This deficiency does not allow farmers to regulate their cash flow, which is fluctuating by nature, nor to invest to intensify their production system.

Financial services and the supply of credit remain inadequate in the face of short-term needs for financing inputs (seeds, phytosanitary treatments, fertilizers, etc.), the fattening of livestock or end-of-harvest storage; in the medium term for equipment, mechanization, access to irrigation, energy, land acquisition or herd reconstitution. Other credit needs lie in activities upstream and downstream of production, at the level of groups, cooperatives or small rural businesses, namely: provision of services for supplying producers with inputs (seeds, phytosanitary treatments, fertilizers, etc.), materials and equipment; product valorization activities (packaging, processing, etc.).

Low levels of formal education and literacy make it difficult to provide information and advice on financial and business management, as well as to provide good planning documents for granting credit. Farmers also generally have little physical collateral, and even in the case of mortgages on registered land and other real estate titles, it is often difficult for lenders to liquidate such collateral in rural areas. Given the often significant distances, transport costs, information collection and other transaction costs are high in any case.

Banking networks have great difficulty assessing the risks linked to the financing of campaign credits: little visibility on harvests, storage conditions, poor logistical infrastructure, unreliability of financial statements, etc. African banks prefer judged commercial operations, less risky. In West Africa, credits granted by banks to agri-food SMEs remain less than 7% of total outstandings. When they access short-term credit, interest rates are above 15%. With permanent cash flow difficulties, African SMEs adopt an attitude of survival, making it difficult to retain a network of producers.

## 2. The seeds of change

As things stand, current agricultural and food systems not only fail to provide sufficient, affordable and nutritious food, they are destroying their own ecological foundations. Current agri-food systems are galaxies away from sustainability.

What are the current transformations likely to reverse the major negative trends affecting agri-food systems? They are numerous and often combine.

### *The flowering of peasant organizations*

Contrary to the naive image we sometimes have, the African rural world is very organized. Whether informal or recognized, large or small, peasant organizations (POs) represent the most widespread form of expression of peasant interests. They have multiplied since the 1990s, sometimes with external aid which, disappointed by the negligence of States in terms of supervision, chose to target community projects on peasant empowerment and found in the POs essential " transmission belts » techniques and economics. They now employ a significant number of farmers and breeders.

Their role has become crucial since the disengagement of the State from various agricultural functions in the 1980s-1990s, whether they concern the supply of inputs, the marketing of products, the management of irrigated areas, information, advice agriculture and extension. Even if they sometimes demonstrate conservatism for reasons linked to the persistence of customary type systems, peasant communities when they regroup and federate make a contribution which can prove decisive for the living conditions of the rural world. They were widely mobilized during the 2020-2022 crisis. They have encouraged agroecological practices, by promoting the diversification of farms, to strengthen local storage and processing capacities, and they have promoted the territorial anchoring of food systems.

We can distinguish three categories of POs found almost everywhere, particularly in West Africa: those specialized in a production sector (cocoa, rice, cotton, soya, etc.), those with a multi-sectoral vocation (training, support for mechanization , access to credit, advocacy) and those which bring together a particular social category (women, young people, breeders, etc.). Most often, they all combine several activities to help producers access markets (marketing, direct sales, knowledge of prices and market conditions) and to better promote their production (vertical integration, processing).

This is for example the case of the Cuma-Benin-Aquitaine Association which supports the construction of a network of 87 cooperatives for the use of agricultural equipment (Cuma) in the north of Benin, bringing together 500 producers on 5,300 hectares, mainly active in corn and cotton. Five Cuma of women transformers are also part of this network. Notwithstanding a sometimes unfavorable economic, political or security context, several producer organizations have managed to increase their skills. The case of *Faso Jigi* from Mali is often cited . This federation of cooperatives currently has more than 120 village groups of cereal producers and a dozen groups of shallot producers for a total of around 4,000 members. It has set up a range of services ranging from access to input credit to market guarantee through its group sales.

## *Multi-actor platforms*

When they take the form of multi-actor platforms (PMA), rural organizations constitute one of the most effective tools in terms of sector governance in favor of poor farmers. The term PMA (*cluster*, *innovation platform*, *value chain platform*, *consortium*, and in French “interprofession” or “interprofessional organizations”) brings together all the formal or informal frameworks within which the representatives of the different links in a chain of values meet, coordinate and make decisions in the interest of all (IFAD, 2023). Most often, the PMAs encountered in the countryside have three main functions: marketing by promoting commercial links; inter-link dialogue by seeking solutions to common problems (on quality standards, prices, logistics standards, dispute resolution mechanisms); finally, political dialogue influencing public policies in a direction favorable to the development of the value chains concerned (regulations, infrastructure, taxation, etc.). In certain cases, it may be a form of “sector government” intended to continue over the long term after the end of a project, with elected representatives. In certain countries, LDCs can also benefit from sustainable financing mechanisms, like the inter-professional associations in Senegal or Ivory Coast which benefit from the resources of parapublic funds such as the National Agro-Sylvo-Pastoral Development Fund (FNDASP) and the Interprofessional Fund for Agricultural Research and Advice.



*Multi-actor soy platform, Benin, © Serge Boya*

Often, PMAs are set up primarily at a local level and often informally, with the function of streamlining commercial relations between stakeholders in a territory. Among the successes reported by IFAD are the building of a commercial partnership between the Olam company and POs in Nigeria through the Commodity Alliance Forum (CAF); the establishment of several innovative services to support PO/market operator partnerships in Senegal, etc. An increase in transactions between buyers and POs and consortium agreements to develop financial products adapted to needs through 12 consortia in Tanzania. The organization of the soybean sector in Togo and Rwanda with the support of the Avril Foundation is part of this logic. In Senegal, review of data on water user associations (WUAs) shows that those that are carefully governed to balance efficiency and equity goals perform best economically. And because these organizations are owned by their members, their performance in principle translates into more benefits for them.



The success of these organizations often depends on the specificities of the production concerned and the configuration of the market. For example, demand must be strong enough to establish a balance of power favorable to the producer at the time of price negotiation. The market should not be dominated by a handful of buyers who determine prices and purchasing conditions.

### *The rise of peasant advocacy*

When peasant organizations establish themselves at the national level as federations, they adopt as their mission the construction of peasant power, of a union character, with the ambition of moving towards the construction of peasant power, of a union character, multifaceted, capable of both influencing the definition and implementation of policies concerning the rural world. Powerful POs like the Federation of Peasants of Fouta-Djallon (Guinea) regularly advocate for protection measures through border taxation. Organizations also exist at the regional level such as the Network of Farmers' Organizations and Producers of West Africa (ROPPA). *Billital Marobé*, the Network of Breeder and Pastoralist Organizations (RBM) is an association created in 2003 by three breeder organizations from Burkina Faso, Mali and Niger to get involved in the regional debate on issues related to livestock breeding and pastoralism. It set up a monitoring tool that provided weekly data and analyzed the economic impact of measures linked to the coronavirus pandemic on pastoral populations in 11 countries. In 2008, the Pan-African Platform of African Producers was created, the continental union of farmers, breeders and fishermen, which has become the main interlocutor of the European Union, UNCTAD, FAO and the World Bank.

POs want to play a role in guiding agricultural policies. The intervention of the National Union of Cotton Producers of Burkina (UNCPB) at the WTO to defend the price of cotton and denounce American subsidies remains emblematic. Some results are significant. The agro-sylvo-pastoral orientation laws (LOASP) of Senegal and Mali, for example, attest to this since they have taken up some of the concerns expressed by the POs. This is also true for the development of Benin's national agricultural policy where smallholder agriculture figures prominently after a long negotiation process. They adopt a critical position by combining technical advocacy with media coverage and denunciation strategies. This is how in Benin Synergie paysanne (Synpa) mobilized on the 2013 land code project in order to fight against land fraud, boundary conflicts, those linked to the contestation of property rights or inheritance divisions, but also land conflicts between farmers and breeders.

The OP model will probably retain its place in the future because of the services it provides. It could evolve, as is already the case, towards that of the cooperative. This status, more comprehensive than that of peasant groups or village associations, presents a certain number of advantages, in particular because it strengthens the contractual capacity of farmers on the organization of their value chain. Interest is also found on the side of companies, whether they are upstream suppliers of fertilizers or downstream processors, in that the cooperative solves the problem of the atomicity of producers.

### *Implementation of targeted regulatory tools*

We can find a consensus, both among decision-makers and among researchers, to consider that one of the goals of public intervention is in particular the prevention and mitigation of hazards which affect agricultural or pastoral systems. Based on experience, it is probably in the combination of several measures that solutions can be found to face risks, through the combination of price support measures and storage mechanisms both at the national and regional levels. and social safety nets.

Precautionary storage in food reserves has long been considered the preferred instrument for mitigating supply risks (frequency, intensity). Reserves make it possible to avoid deficits, counteract panic movements and intervene in a targeted manner for the benefit of vulnerable populations. *National security stocks*, physical or financial, are old and numerous, particularly in West Africa, the Horn of Africa and Cameroon. In the latter country, the Cereal Office, the public body dedicated to the regulation and conservation of cereals, acts as a purchasing center by intervening in the markets of cereal producing and consuming areas. Potential beneficiaries of the stock are estimated at 7 million people.

### ***Various types of food stocks***

*The use of public stocks of food products has two objectives: to protect against risks of shortage, to intervene in the markets to guarantee a certain price level. They are recommended in situations characterized by high price volatility when market mechanisms (futures contracts, crop insurance, production or consumer credit) do not work or work poorly.*

*We distinguish*

*- Strategic stocks are limited to very specific situations of shocks calling into question national security, and which are encountered in the case of countries dependent on imports for their supplies and subject to high risks of cutting off external flows.*

*- Intervention stocks are found in countries where agricultural policies provide for obligations for the authorities to purchase agricultural products, at a minimum price aimed at guaranteeing the income of national producers.*

*- Public buffer stocks, under a national policy or international agreements, make it possible to control price variations within a predetermined maximum-minimum range in order to protect producers from exceptionally low prices and consumers from exceptionally low prices. Tops.*

*- Emergency stocks are food safety nets put in place to deal with critical situations of shortage and sharp price increases or disasters (tornado, earthquake, civil war). They are often financed by food aid or by countercyclical loans from external donors with rapid disbursement.*

The case of ECOWAS is one of the most interesting. Since 2013, the regional organization has had a Regional Food Security Reserve (RRSA) of 34,000 tonnes, as a line of defense in the event of a food crisis. It includes physical stock distributed in four storage areas capable of ensuring rapid supply and a financial reserve for additional purchases. Its funding is provided by a combination of national, regional and international resources. The ECOWAS approach is also based on the establishment of a complementary line of defense: local stocks, which ensure food security at the local level while guaranteeing farmers' income through group marketing. Local stocks are generally collective initiatives managed by producers with the aim of improving the availability and access to food (food security granaries), or to increase income by purchasing grain from producers when prices are low and to sell it when prices are more profitable (commercial stocks). The community base of local stocks facilitates action at the local level and gives stocks the flexibility necessary to adapt their composition and the services they offer to each local context .

### ***The expansion of counseling methods***

Agricultural research only has an impact if extension services succeed in integrating the technologies into the beneficiaries' practices. The purpose of agricultural advice is to disseminate technical, financial and economic knowledge to farmers, based on their needs and with the aim of improving their production. The notion of *advisory support* often appears more appropriate to designate the relationships between specialized services — public, associative

and private — and producers. Training local skills contributes to the sustainability of innovation.

In general, technical and vocational education and training have been poorly resourced in Africa. In terms of adult training, an agricultural extension method has long been favored: the Benor method known as “training and visits” (*Training and Visits*). It consists of training producers and then monitoring them on their farms. Recommended by the World Bank in the 1980s, it is structured and disciplined with precise programming for the training of village extension workers by specialists in various disciplines. It requires a dense support network.

The new support-advisory methods adopted since the beginning of the 2000s are based on the observation that prescriptive approaches limited to the technical dimension are not enough. They are based on participatory methods in order to better take into account the needs of farmers or to promote their autonomy.

Certain approaches that go against the dominant “top-down” training system stand out:

1/ That of the *farmer-to-farmer council*, supported by NGOs, mainly promotes the endogenous knowledge of farmers, the effectiveness of which has been demonstrated. Called “pilot producers”, “training farmers”, “multipliers”, the relay farmers have their own know-how which they combine with knowledge of new techniques which they have tested themselves under the supervision of advisors. The technical message is better understood and accepted if it is presented to farmers during visits to experimental plots by one of their own. They are a transmission belt: they understand and disseminate messages from the grassroots to the producer organization, and vice versa.

2/ That of the *farmer field schools* aims to promote cross-learning processes between farmers and technicians around a demonstration plot. The use of field schools can be used to carry out tests in a controlled or semi-controlled environment. Farmers observe agroecological techniques and compare them to traditional techniques. The method can also be extended to study trips to other regions which allow farmers to compare their framework with different situations and to put the rationality of their own practices into perspective.

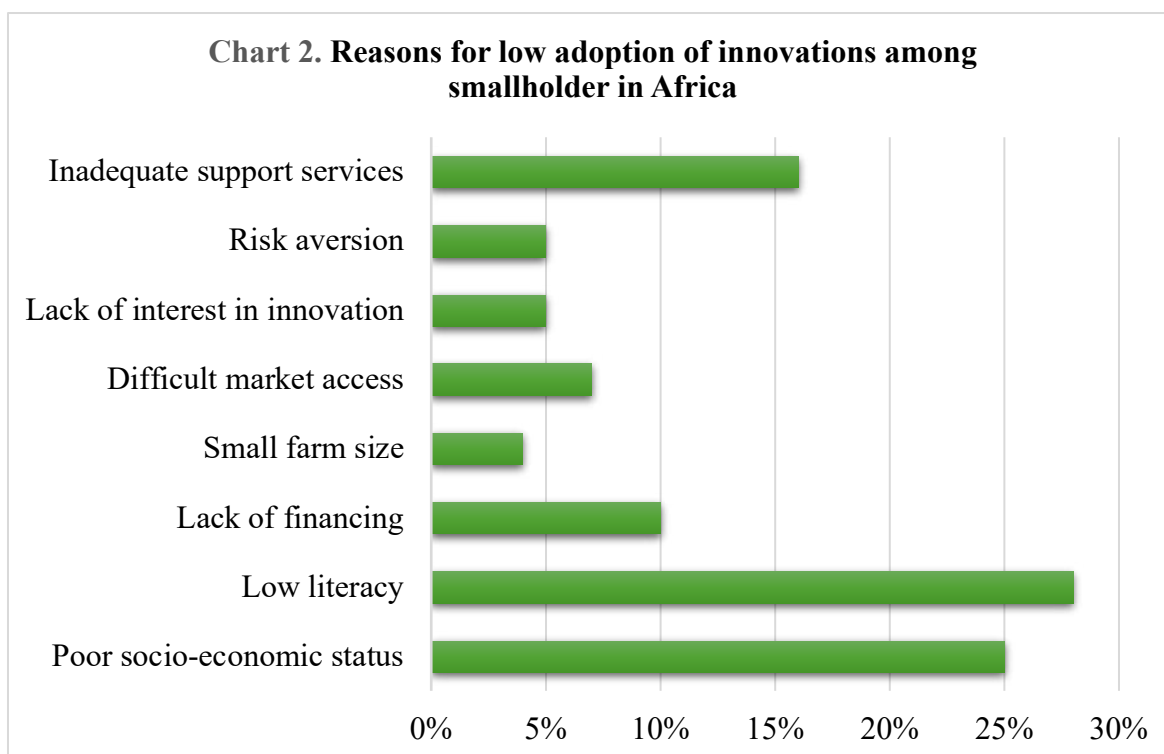
3/ That of *mobile laboratories* which are a modern version of this mode of learning. It is implemented for example by OCP-Africa in Ivory Coast, Ghana and Tanzania. Thanks to a team of agricultural engineers, farmers benefit from multi-year support and technological solutions. The laboratory makes it possible to address more technical aspects such as soil nutrient requirements and fertilizer recommendations adapted to local soils and crops. The laboratories are equipped with modern technologies, including mid-infrared and technical X-ray sensors that can assess soil fertility in real time.

4/ Still in the logic of taking into account the local context, that of *agricultural caravans* which provides *traveling* personalized advice to provide producers with soil analyses, recommendations for the use of fertilizers adapted to the specific needs of soils and plants as well as training in good agricultural practices. In Morocco, the *Soil Fertility Map*, which covers 7 million hectares of cultivated agricultural land, is at the center of this system.

5/ Finally, *innovation platforms*, promoted by international research, have been adopted by several institutions (FARA, CORAF/WECARD) to promote the adequacy of research to ecosystems.

Combined offers of services and advice are most often promoted to remove reluctance to change.

A Heifer International survey (2021) of 300 farmers in 11 countries identifies the main resistances to technological change (chart 2). The smallholder farmers interviewed suggested that their low literacy levels, socio-economic status and insufficient or absence of extension services were the main reasons for their low adoption of technologies.



Source, Heifer international, 2021

Programs like the Fertilizer and Seed Recommendation Map for West Africa (FeSeRWAM), an online platform *launched by the IFDC, an independent American organization*, and the *West and Central African Council for Agricultural Research and Development (CORAF)* can contribute to the dissemination of the most recent agricultural practices to farmers. For ecosystem and crop research, the user can filter for potential yield, days to maturity, pest and disease resistance, and rainfall. Agricultural input packages include crop details, fertilizer recommendations, best management practices and color maps showing where the crop grows.

*Agribooster* program, launched by OCP Africa to promote soil health in 2016, provides farmers with customized fertilizers and offers extension services throughout the agricultural value chain. The program is already having a significant impact on the lives of 850,000 smallholder farmers involved in the maize, rice, millet and sorghum value chains in Ghana, Tanzania, Ivory Coast, Senegal, Nigeria and Kenya. The average crop yield on participating farms saw an increase of 33%, demonstrating the effectiveness of these initiatives in addressing the challenges of low agricultural productivity in Africa. The program ensures that farmers have access to essential agricultural inputs, including fertilizers, seeds and crop protection products. Local extension agents guide farmers on best practices to use inputs efficiently. *Agribooster* also facilitates access to financing and insurance, which strengthens the resilience of farmers.

Another example, OCP Africa has set up 10 *Farmer Hubs in Ivory Coast* as a “one-stop shop” which allows farmers to access inputs (fertilizers, seeds and phytosanitary products) and agricultural services (training in good practices agronomics, soil analysis and recommendations, financial services, market connections, mechanization, etc. These packages are disseminated with the deployment of “agripromoters” equipped with tricycles and tablets) to ensure that farmers take the necessary measures to obtain optimal harvests. Agripromoters also found in Nigeria also play a central role in providing soil analysis, mapping services, training and information services.



*Agripromoters in Kaduna, Nigeria, © OCP-Africa*

Advisory services via telephone platforms and online resource centers (information on prices, weather, production techniques) have a certain future almost everywhere in Africa.

### *A trend towards the commodification of land*

In principle, the methods for “fixing” land rights evolve relatively slowly due to social rigidities in rural areas. But, in the current context of transformation of rural realities, it is clear that there is an acceleration in the process of inclusion in the market economy of modes of access to land and its resources, thereby escaping the lineage relationships which were once the substrate of identities, balances, beliefs. To the point that the affirmation of the inalienable character of the earth, often associated with the mystical links earth-ancestors-geniuses-fertility, would today refer to a backward-looking perception, seriously shaken by the facts. The earth, in a way, is becoming desocialized.

If we put aside the most remote, landlocked areas, far from roads and markets, this “commodification” of access rights to land can be seen almost everywhere with the move upmarket of medium-sized farms, particularly in the range of 10 to 100 hectares. What follows is an irreversible erosion of customary tenure under the effect of the individualization of rights and a parallel confiscation of land rent.

The process of commodification of rural land is today identifiable in several trends observable in most African regions:

- a slow, but irreversible fragmentation of customary tenure;
- a diminishing control of the State in its role of assignee or regulator which must deal with other stakeholders (local authorities, civil societies, businesses, peasant groups);
- increased concentration through the acceleration of land acquisitions by agribusiness operations benefiting from significant investments;
- a parallel confiscation of land rent outside the lineage sphere, the community or the chiefdom;
- finally, a trend increase in the price of land both in rural areas and in cities.

By focusing on (exclusive) property rights and ignoring the various usage rights, privatization/commodification approaches to land users present the risk of ousting a number of farmers who nevertheless legitimately believe themselves to be “owners” of their lands. Successive generations of young farmers will face increasing competition for agricultural land.

In contrast, farmers with financial capital and the potential to cultivate larger plots are more likely to benefit from land markets.

In the late 1980s, organizations such as the World Bank advocated the need to encourage radical changes in customary land law systems by creating a direct link between land individualization, environmental conservation and agricultural intensification. These changes involve in particular the codification of land tenure systems in the form of cadastres supposed to encourage their gradual evolution towards private property. Since the beginning of the 2000s, we have seen a shift in this position. Certain political choices regarding land give back a place to the management and appropriation systems and to the usage rights which prevail locally.

The controversy over large-scale land appropriations has been intense since the end of the 2000s. If the promoters of the transactions insist on the "win-win" aspect of land acquisitions, some remain skeptical about the overall benefits and long term of such initiatives.

In Africa, land appropriations find their justification in the erroneous idea of the existence of significant "idle land". Land Matrix has identified nearly 690 contracts for large-scale land operations signed or in progress across the African continent between 2000 and 2020, covering an area of nearly 24 million hectares of land, more than the equivalent of the arable areas of Zimbabwe and those of South Africa combined. The most coveted countries are South Sudan, Mozambique, Lesotho, Gabon, Ethiopia. Investors — 80 % non-African — are allocated large cultivable areas, in certain areas particularly favored in terms of fertility, access to water and infrastructure, sometimes at the expense of the rights of farmers and breeders. of the place, confined to small areas or hampered in their essential transhumance.

Land acquisitions lead to intensive monocultures (cereals, agrofuels) geared towards export, raising fears here and there of the risk of hydrological suicide. It is a fact of observation in many cases, they lead to forced deprivations by sometimes violent forms of expropriation to the detriment of the former operators, sometimes converting them in spite of themselves into agricultural workers on their own land.

The recent period suggests a slowdown in major land transactions in Africa. It is explained by the drop in prices of agricultural products from 2014, by certain "failures" of important productive projects, but also by the rise in disputes associated with the awareness of the risks presented by land acquisitions on food sovereignty of the communities and States concerned.

### *New approaches to land*

The "topographic" and "notarial" approach in favor of individualized land titling, recommended by the World Bank and other institutions, has the disadvantage of ignoring the complexity of land management methods in sub-Saharan Africa, which is found, in the tangle of several systems, from the customary regime to the modern Western legal regime, including different land rules inspired for example in Islamized areas by Muslim law.

Alternative approaches that attempt to recognize the diversity of existing rights and the plurality of standards of access to land and its resources promote new legal rules, closer to local forms of appropriation of land and resources. "Simplified and secure" titling operations, consisting of registering occupancy rights, have been launched in certain countries.

Several other states have undertaken major land reforms over the past twenty years. Sometimes with difficulty. Thus, Côte d'Ivoire promulgated a law relating to rural land in 1998 with the objective of registering rural land and issuing individual private titles in a context of significant land disputes between natives and immigrants. In 2018, only 200,000 hectares of rural land had been certified out of a target of 23 million. The main applicants were urban farmers. The fear of traditional leaders is to permanently lose control over ancestral lands by granting a land certificate to "non-natives". (Institut Montaigne, 2023).

The challenge everywhere is to move away from the duality between local practices/legal framework, to put an end to the principle of state ownership (land belongs by default to the State), and to build hybrid approaches to land management. These must integrate the diversity of situations and conceptions of land rights, and create new alternative legal categories to titled private property (land certificates, « small papers », etc.) with land governance within which the administration, local communities and customary authorities are required to cooperate.

Can land formalization programs generate significant positive externalities? The case of Benin is exemplary. He was a pioneer. From the end of the 1980s, Rural Land Plans (PFR) were launched. This was a process of mapping customary, individual or collective land rights, designed to fuel a future reform – which was finally adopted in 2007 – granting legally recognized rights to farmers. The PFR program which was launched in 2009 is a set of several interventions serving to formalize and support traditional systems of local land governance. Land holdings were demarcated in villages, usage rights were documented and institutions were created to facilitate conflict resolution. The guiding idea was on the one hand that demarcation and certification would improve farmers' tenure security on agricultural plots, leading to an intensification of agricultural practices and a reduction in the need to clear new land, and on the other other than resolving conflicts, clarifying land boundaries and documenting use rights would reduce the transaction costs involved in managing common resources, including forests. The analysis now shows that the PFRs have effectively made it possible to achieve these objectives: agricultural productivity on existing plots has increased, the need to clear existing forest land has decreased and land governance has significantly improved, with a reduction in tree cover loss and fires in affected village areas.

*Blockchain* technology can be used to secure land tenure. The failure of land registers has serious consequences on the agricultural economy, since the instability of property rights does not encourage investment or development of production. It makes it possible to list land and store information in a transparent, public and secure manner, thus guaranteeing ownership of the listed property. Rwanda has cadastral registers using blockchain technology. In Kumasi, Ghana, the *Bitland project* allows institutions and private individuals to survey their territories and register their land deeds on a blockchain.

However, difficulties of several types remain: they presuppose the existence, at the local level, of new skills, which are not always available. The actions to be carried out are of considerable scale: demarcate terroirs, confirm historical rights, validate acquisitions justified by uses and recognize the diversity of formulas, strengthen the skills of local authorities, set up arbitration procedures and resolving land conflicts.

### *The new agroentrepreneurs*

Ghana, Kenya, Malawi, Tanzania, Rwanda and Zambia, for example, are experiencing major changes in agricultural land ownership patterns. The share of land of small farms of less than five hectares has decreased. Medium-sized farms, of 5 or more, up to 100 hectares, on the other hand represent a growing share of all agricultural land. These farms can represent up to half of all cultivated land in Zambia. In Ghana, the share of total cultivated area occupied by farms of more than 5 ha increased from 39 to 60% between 1992 and 2020. In most cases, this movement reflects an increased interest in land on the part of city-based agri-food sector professionals.

The project managers of this new private agriculture, which leans more towards the agribusiness vision, often supported by local banks, but also by foreign financial partners, are “agripreneurs”, national entrepreneurs of various origins: large traders, managers of cooperatives, politicians, civil servants, former employees of state companies made unemployed, migrants returning to the country.

In the six countries cited above, data from the demographic and health survey (EDS) show that urban dwellers own 5 to 35% of all agricultural land and this share is increasing in all countries. Between the city and the countryside, agripreneurs have the common characteristic of having “one foot in, one foot out”. They have initial monetary capital which allows them to have a guarantee for credit and are rather oriented towards short value chains, from production to retail trade, in particular in supermarkets. To respect the contractual standards of quantity and quality imposed by end traders, they tackle, with a certain efficiency, production and market issues (improvement of yields, water management, storage, marketing, certification) , access to financing, links between the different actors. Some with strong management capacity play a key aggregator role in product promotion, processing, monitoring and marketing.

A new category of rural, or rather often “rurban” operators therefore appears. With farms of varying size. They invest in land, irrigation, seeds, fertilizers and digital technologies. With them, new technologies appear, developed by young start-ups. From micro-irrigation, through drones to spray inputs, or even digital applications for marketing foodstuffs, to tool maintenance, these new tools aim to enable better agricultural production. Their activity leads, thanks to the intensification of agricultural practices, to a general increase in yields. Straddling the fields of production, the world of processing and that of marketing, it encompasses a multitude of very diversified activities around products from agriculture and agro-industry.

The “new national agricultural entrepreneurs” who have become the most numerous purchasers of land over the past twenty years, especially near cities, tend to invest energy in agricultural pressure groups and to try to influence by their favor policies and public spending devoted to agriculture. They can influence the location of agricultural growth and become employment multipliers between rural and urban areas. They can take advantage of the new opportunities opened up with the redefinition of land use planning models, in vogue in several countries, with agropoles and agro-industrial parks.

### *The relative advantages of contractualization*

The development of contracts is increasingly considered as an indicator of cooperation between different actors belonging to the same value chain. It builds loyalty among actors; it secures supplies; it improves quality; it generates economies of scale. Its beneficial impact on producers' income is widely documented. Thanks to the guarantees they provide, contracts can encourage farmers to take certain risks by launching into new production. In addition, good practices (adapted fertilization, use of improved seeds, reasoned phytosanitary protection, etc.) can be implemented by the producer thanks to the technical supervision provided under the contracts.

Contractualization is supposed to break with the configurations of “captive governance” which are old in agriculture and which we find in particular in the sugar, milk and palm oil sectors where a large number of small farmers are put in place. situation of “dependent asymmetry” vis-à-vis the primary processing factories which constitute the only channel to sell their production and obtain the inputs they need. In Kenya for example, 50% of tea and sugar and most of horticultural production fall under this mechanism.

In experience, the participation of producer organizations (POs) is often a conducive condition to the dynamics of contract farming, because they make it possible to rebalance negotiation relations and, by facilitating the establishment of contracts, compliance with commitments of both the producers and the company. The involvement of POs in contracts seems to have improved since the 2000s thanks to various developments: the implementation of training, network operations coupling local and national representation, their recognition as



negotiation spaces, and , very often, support for their operation by the government, civil society and development agencies.

Successful experiences concern the liaison between POs and the processing sector, when small farmers become aware of the convergence of interests which links them to artisanal processors, the vast majority of whom are women. The starting point is often the creation of a consultation framework including producers, processors, traders, but also decentralized State services, local authorities, financial institutions.

We find an example in Benin. Since 2013, the cooperative society of collective interest, SENS, has been running the B'EST (Benin Entrepreneurship in Solidarity with its Territory) program in the departments of Zou, Collines and Borgou in Benin. The project team supports the development of family farming through the establishment of the soybean sector. It is based on an original link: the small units playing a pivotal role in the sector, called Essor (Solidarity Enterprises for Rural Services). Each Essor was linked to a network of around twenty agricultural producers and around fifteen soy tofu *processors* . Target contracts have been signed with each Essor. They provide six services: support for village producers in soya production; purchase, storage and sale of soybeans; mechanized soybean threshing, advice to family farms; introduction of producers to the production of aromatic and medicinal plants; training of producers and awareness of rural households in agroecological practices.

In a context of massification and standardization of food and to meet growing requirements for quality, hygiene and traceability, companies see in contractualization a means of securing their supplies to ensure volumes and quality standards. (in particular caliber and hygiene), production methods and even prices.

For growers, in the best of situations, contractualization guarantees them a price in advance, in exchange for the commitment to deliver the production, often, strict compliance with specifications (cultivation practices, type of inputs used). The advantages can be significant: they benefit from a secure market and guaranteed prices, with all the services essential to production (technical assistance, access to inputs, credit, transport, etc.).

On both sides, based on the work of the Farm Foundation, the benefits are clear.

**Table 3. Comparative advantages of contractualization**

<i>Benefits for producers</i>	Solidarity operation Pooling of services (supply, marketing) Market access, including certified More balanced balance of power with the buyer
<i>Benefits for businesses</i>	Consolidation of the offer Quality control Facilitating communication with producers Access to certified markets

Source: FARM, 2018.

Many studies show the positive effects of contract farming on producer prices, agricultural productivity and farm household income. A review of 30 empirical studies places income gains in a range of 25 to 75% (Minot et al., 2019). Empirical results reveal that smallholder farmer participation in a rice value chain is associated with an increase in paddy price, quantity traded and net income. Furthermore, value chain participation decisions and market performance are positively and significantly influenced by social networks. The empirical results also suggest that gender, farm size, mobile phone ownership. These findings are promising.

On the other hand, some analysts note that the system sometimes presents the risk of favoring the monopolization by some of the largest farmers of most of the volumes

granted and the inputs distributed. In reality, the terms of the contract reflect an existing balance of power, sometimes unfavorable to small producers. This is why the existence of a producer group or a cooperative to negotiate collectively helps to improve this balance of power.

### *Promoting agropoles*

“Agricultural growth poles”, “agropoles”, “agro-industrial parks” and “agro-incubators” represent a new trend in agricultural strategies, built on the logic of public-private partnership. The World Bank, in its strategy for Africa developed in 2011, identified growth poles as a new approach with a set of projects dedicated to the agricultural sector. The commitment of the African Development Bank (AfDB) is more recent; as part of the “2016-2025 agricultural transformation strategy”, agropoles have been identified by the financial institution as one of the flagship instruments for the development of 18 integrated value chains.

General principles govern the establishment of agropoles: a territorial development approach with the creation of basic infrastructure around local potential; a “value chain” approach around priority sectors; incentive land, tax and customs regulations (Picard, Coulibaly and Smaller, 2017).

Since the beginning of the 2000s, around forty agropoles have been created across the African continent. Cameroon is the pioneer in this area, with 46 agropoles distributed throughout the country and a large number of small projects. Countries such as Burkina Faso, Ivory Coast, Mali and Togo are part of the dynamic of creating agropoles and display the desire to make them one of the pillars of the second generation national agricultural investment programs of the ECOWAS countries. In Benin, 7 agricultural development centers were created with specialization in a particular speculation (rice growing in the Niger Valley, arboriculture in Zou, cotton in Borgu and Alibori, fishing in the Atlantic, etc.). In Gabon, 40 high productivity agricultural zones (ZAP) were released in 2022, spread across the entire country, with registered plots made available for food production (banana, cassava, corn, rice, soya) and development. pig and poultry farming. In Tunisia, the Bizerte agri-food technopole, AGRO'TECH, extends over 45 ha located in Menzel Abderrahman; it is part of the National Strategy for the promotion of the agri-food sector of the 11th Development Plan. As part of the Green Morocco Plan, the Shereef Kingdom has established several agropoles (Fez-Meknes, Berkane, Béni Mellal, Agadir, El Haouz and El Gharb). That of Meknes is based on a land base which amounts to 466 hectares to accommodate service companies for the food industry, business incubators, technological and commercial platforms, distribution infrastructures particularly for local products and intended for large areas.

The Special Agro-Industrial Processing Zones (SAPZ) program is a flagship initiative of the AfDB. These zones bring together the production, processing, storage, transport and marketing of agricultural products. Among the SAPZ projects currently being implemented, there is one in Ivory Coast, one in Guinea, one in Mali, one in Madagascar, one in Senegal and another in Togo; and four in Ethiopia. The SAPZ program in Nigeria is the largest, both in scale and scope. Phase 1 is implemented over five years, starting in 2022. It concerns 7 states.

Hindsight is lacking for the evaluation of these formulas. The implementation of clusters is often the most difficult phase for governments due to the resources and capacities to be mobilized. The clusters sometimes encounter governance and operational challenges.

### *The countryside-city gap called into question*

The time when the peasantry's diet relied almost exclusively on self-consumption is over. Farmers who are solely self-sufficient remain an exception.

Self-production is not the main source of food in rural areas of the 11 African countries considered by the 2023 FAO report. In fact, it only represents on average 35% of total household food consumption, which refutes the idea that rural African populations rely primarily on subsistence agriculture.

In West Africa, rural households use the market for more than half of the value of their consumption, part of which is for food purposes. In return, they sell a fraction of their food on the market. They also engage in non-agricultural activities to buy additional food, particularly during the lean season.

Certainly situations of extreme isolation persist, but the majority of the countryside is fairly well connected by public transport. Radio and mobile telephony stimulate access to information and the need for mobility. Around the agglomerations with a national or regional vocation, with a set of diversified services, we observe the creation of a string of small towns built on former village centers which have become urban microcenters.

Roads and markets, but also electricity and water infrastructure, educational establishments and health structures promote “rurbanization”. Spaces overlap, circulation intensifies. Nearly three-quarters of Africans live at the interface between rural and urban areas .

*The “rural” and “urban” categories therefore no longer capture spatial and occupational complexity.* The strict dichotomy corresponds less and less to the realities of the “lived spaces” of the populations of Africa and it leads to having policies in silos, which reduces their effectiveness. It is therefore necessary to adopt a complex perspective based on *the notion of rural-urban continuum* .

### *The city and its outskirts nourish the city*

According to the FAO, in 2019, 40% of urban households in Africa carry out agricultural activities in the city, in one form or another. This figure may be approximate, but it reveals the scale of the phenomenon. The majority of leafy vegetables consumed in Accra, Bangui, Brazzaville, Casablanca, Douala, Kinshasa or Lagos are produced by urban and peri-urban agriculture. The diversification of food contributes to the development of local, short-circuit, intensive market gardening, often using high-performance varieties selected by research. Agriculture has therefore entered the space of the city. Around expanding urban areas, a spatial organization of exchanges and markets has been established.

Peri-urban agriculture encompasses diverse activities ranging from aquaculture to livestock and from horticulture to agroforestry. Certain activities are concentrated in peri-urban areas (livestock breeding), while others are carried out in the very fabric of cities (market gardening). All places are taken over: sidewalks, backyards, gardens, ditches. In Antananarivo, family orchards creep between buildings. Aquaculture, for its part, depends on the presence of ponds, streams, estuaries, lagoons, while agroforestry is practiced more in the presence of green belts. For this wide range of activities, farmers adopt and adapt technologies suitable for urban environments, sometimes with the excessive use of chemical pesticides, as in Niamey where the use of 22 banned products was observed , and the use of the others authorized at doses 3 times higher than those recommended.

In Dar es Salaam, 90% of the demand for vegetables is provided by peri-urban agriculture. In Kampala, 70% of the demand for poultry meat and eggs is met by agriculture in close proximity to the city. In Cairo, 80% of the milk supply for the twenty million inhabitants is provided by small farms located on the outskirts of the capital.

In Kinshasa, there are ten thousand market gardeners, two thirds of whom practice occasional market gardening. The city of more than 10 million inhabitants has 400 markets,

with around a million traders. The commercial opportunities offered by urban markets encourage growth in investment in agri-food by new agri-entrepreneurs.

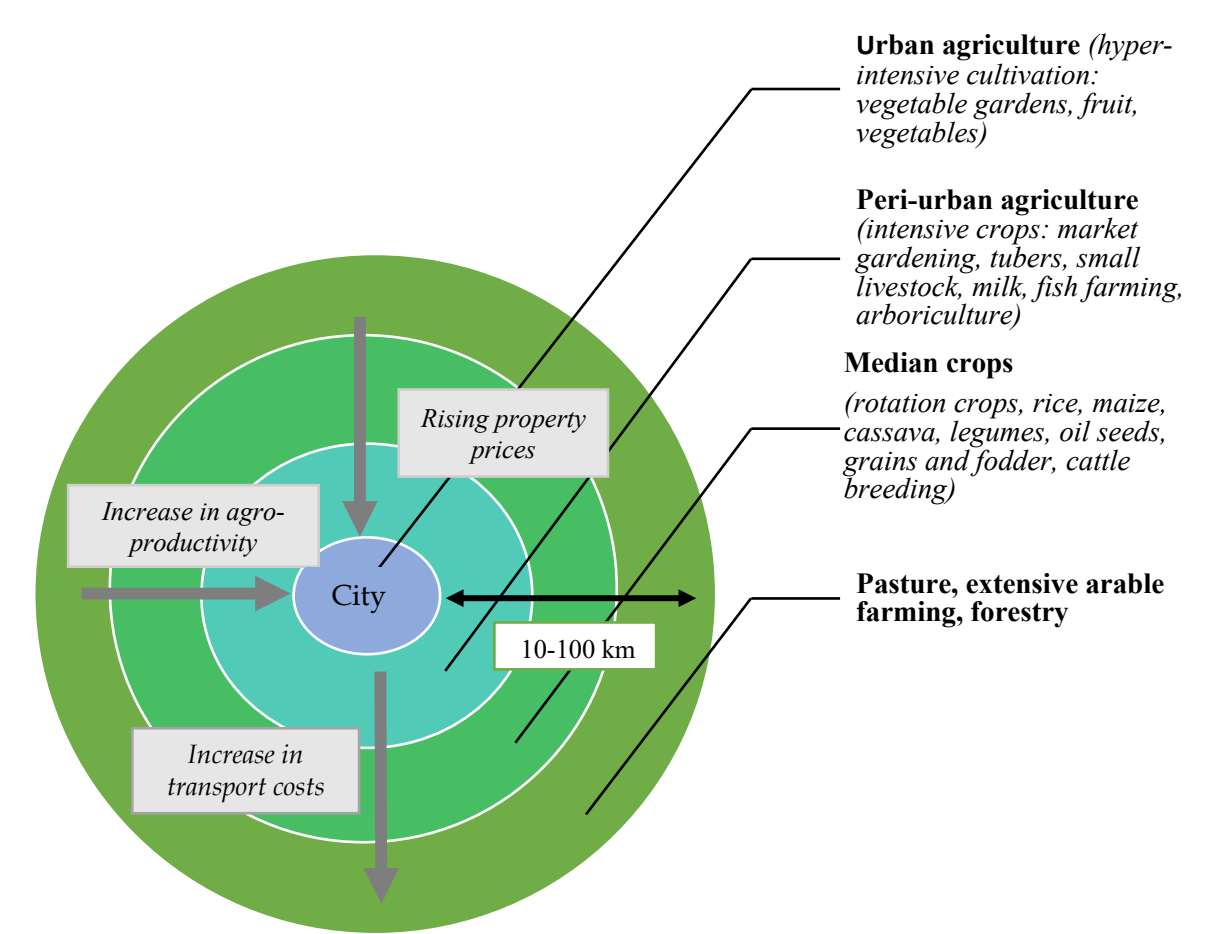
The wilaya of Algiers, which is home to 3.2 million people in a fragmented and heterogeneous ecosystem, has created 23 *Agriparcs* since 2010 to protect surrounding agricultural land from urban sprawl and reweave traditional links between agriculture and its basin. of consumption (the capital).

### *Metropolitan food areas*

The growing interweaving of cities and countryside produces new forms of territoriality. Around all major African cities, both coastal and inland, *metropolitan agri-food areas are forming*, encompassing cities, secondary towns, villages and countryside which present a high degree of integration. The dynamics of these ecosystems allow the valorization of endogenous food resources.

The allocation of agricultural land is carried out according to more or less regular concentric rings, going from the heart of the city to its distant outskirts. By analogy with Johan Heinrich von Thünen's model (1826), the most profitable crops and involving high transport costs per unit produced are planted closest to the urban market (Figure 1). Their productivity covers a high land rent. On the other hand, productions with a low transport cost, but which are the least profitable, will be in more distant circles. At a distant point, the increase in transport costs can become such that the net profitability of a product becomes prohibitive.

**Figure 1. The distribution of activities around the city**



The length of value chains increases as cities grow. Here we find the concept of the RUAF foundation (Global Partnership on Sustainable Urban Agriculture and Food Systems) and the FAO of *City-Region Food System* (CRFS) which emphasizes the spatial development of systems.

Urbanization is not limited to “megacities”; it also generates secondary cities. The foodshed is relatively close to their urban centers and the consumers who live there. The commercial food crop irrigates the heart of the towns, with market gardening, fruit crops and poultry and dairy farming around them and, further afield, areas devoted to cereals (rice, corn, sorghum, wheat, but more rarely), tubers (cassava, okra, eggplant, etc.) and vegetables suitable for storage and transport.

### *Urban rice, field rice*

The increase in rice consumption in Africa is correlated with that of urbanization. It has established itself in urban eating habits: it is in fact easy to cook and requires less work than other cereals. On average, in West Africa, rice consumption has increased fourfold in thirty years. However, despite the progress observed in local production, especially thanks to the extension of irrigated rice areas and the development of lowlands, the continent must import the equivalent of 45% of its total consumption.

In Madagascar, rice is the staple food of the Malagasy people who consume an average of 135 kg per year. Until 1970, the country exported rice while today the country imports it. Paradoxically, these imports are cheaper than local production. The state plans to increase rice production in order to regain the country's self-sufficiency. The difficulty comes from the fact that the low-lying flood-prone areas where irrigated rice is grown are saturated. The recent release of altitude-tolerant varieties has led to a rapid expansion of upland rice cultivation in the Highlands region. However, the average yield currently obtained is low, of the order of 1.6 t/ha, much lower than that of 4 to 6 t/ha obtained in research stations, where in particular bioaggressors — pests, diseases, weeds — are controlled.

Almost everywhere, local production encounters competitiveness problems compared to rice imported from Viet Nam, Thailand or India. Imports, organized by big traders – the *Big Men*, the *Grand Boubous* – have tripled over the last two decades and make West Africa the leading rice importing region in the world. A study of Hortitechs carried out in Benin, in 2019, in six large cities of the country (Cotonou, Porto Novo, Lokossa, Ouidah, Bohicon and Parakou) showed that consumers prefer to buy imported rice because of its cost, packaging more attractive and also its availability: processed local products are not available everywhere in the country while imported rice is present even in the most remote villages.

Only Mali, a landlocked country with a long rice-growing tradition, covers its demand independently with 3 million tonnes produced on average annually. The Rice Initiative has made it possible to promote access to improved seeds, fertilizers and credit (for the acquisition of seeds and tools). The sector is characterized by the atomization of its actors: 1,303 peasant organizations are listed in the Office du Niger area; 517 in the Mopti Office. However, it should be noted the emergence of the Mali Rice Producers Platform (PNPRM) which has 300 basic POs. The average yields obtained are of the order of 2 to 3 tonnes per hectare. Irrigated cultivation largely dominates, particularly with the Office du Niger where more than 61,000 family farms produce 674,000 tonnes on 115,000 hectares (with a yield close to 6 tonnes per hectare). However, since 2008, rainfed rice has also developed, especially in the South, around Sikasso and Koulikoro, with the New Rice for Africa (NERICA) variety.

Performance in the rice sector is linked to recovery measures which concern two types of actions: on the one hand massive developments (lowlands, irrigated plains) for producers and on the other hand market regulation mechanisms. To this end, programs such as the Rice

Initiative in Guinea, the Great Agricultural Offensive for Food and Abundance (Goana) in Senegal, the Emergency Food Security Support Program (Puasa) in Benin or the Presidential initiative of 1 million tonnes of rice in Burkina Faso has been launched to boost production.

Biotic and abiotic constraints are the main factors responsible for the low productivity of rice cultivation. Most of these stresses are associated with soil nutrient depletion and imbalances (salinity, nutrient deficiencies, and toxicities) and water availability (drought or overwatering) under rainfed conditions that prevalent in Africa. Furthermore, salinity in Africa's rice production system is seriously aggravated by the use of large amounts of irrigation water in lowland rice, poor cultivation practices of farmers involving the use of groundwater brackish.

Industrial rice mills lost their importance from the 1990s. Hullers and mini-rice mills managed either by peasant organizations or by private operators replaced them. They processed around 80% of national production. These entities are generally relatively inefficient, with a transformation percentage below 60% and a high breakage rate.

AfricaRice, one of 15 International Agricultural Research Centers that are members of the CGIAR Consortium, has launched Smart-Valleys , a low-cost approach to developing lowlands for rice-based production systems in sub-Saharan Africa. It was developed in Benin and Togo. Compared to conventional approaches which involve costly topographical studies and heavy investments for the construction of elaborate water control infrastructures, the Smart-Valleys approach includes water management works - water intake, drains and dikes — to allow water retention at a lower cost, and which can be entirely built and maintained by producers. Among those in Benin and Togo who adopted the approach, they saw their rice yields, under rainfed conditions, increase from 1.5 - 2 tonnes per hectare to 3.5 - 4.5 tonnes per hectare.

Conquering the domestic market is not an easy affair (Coste and Egg, 2021). Senegal is an interesting case. The country has long intended to ensure its self-sufficiency in rice. But he doesn't succeed. Its production from the Senegal River valley, Anambé and Casamance is insufficient compared to domestic demand. During the 2010s , the average coverage rate was around 30% (600,000 tonnes of paddy, equivalent to 390,000 tonnes of white rice produced for a consumption of more than one million tonnes of white rice). Imports from Asia or Brazil and Argentina in the form of flavored chips are responsible for 16% of the trade balance deficit. However, notable progress has been recorded in terms of technical routes and processing into white rice.

Logically, producer margins are very sensitive to the prices charged; but the fact is that rice is almost not protected at the borders and that cheap imports are favored, the margins of producers and processors are insufficient to constitute an incentive. Today, the ECOWAS common external tariff (CET) is 10%, a level obtained after 15 years of discussion, which some consider low, especially since it is unevenly applied. The regional farmers' organization, Roppa, is asking these same regional authorities to implement a strong rice policy. He calls in particular for an increase in the CET for rice, from 10 to 35%, in order to protect the development of local rice chains.

### *The food offering is diversifying*

Could the war in Ukraine and the rise in world wheat prices be the occasion for a historic break in cereal consumption?

In Togo, the Organization for Food and Local Development (Oadel) obtained the signing of an interministerial decree in 2019 requiring the incorporation of 15 to 50% local cereals into “French bread” and similar products. Other African countries have been considering replacing part of wheat flour — produced from imported cereals — with cassava flour for more than a

decade. The DR Congo legislated in 2020 on the adoption of a rate of 5% cassava in compound flours intended for bread-making and 10% in those intended for pastries.

Côte d'Ivoire thus adopted the NI 380 standard in 2022 specifying the use of 15% cassava or corn flour of local origin in the making of mixed bread. Before 2020, Nigeria and Cameroon had already regulated the mandatory properties of cassava flour — without imposing its use on bakeries. High-Quality Cassava Flour (HQCF) flour, i.e. unfermented — unlike most products from traditional processes (foufou, gari, etc.) can replace up to 15% of wheat flour in bread, without altering its taste and consistency (Global Sovereign Advisory, 2023). It can also be used in the composition of other basic foods (pasta, biscuits, donuts, etc.) at even higher percentages. In Cameroon, you can find cupcakes and cakes with 100% cassava flour.

Policies can be muddled by contradictory initiatives. To respond urgently to the surge in bread prices, which carries social risks, Côte d'Ivoire, a few months after Gabon, granted millers, in May 2022, a subsidy for the purchase of wheat flour. . These two countries have thus joined the DRC, Benin and Cameroon, major producers of cassava, which have also long subsidized their wheat imports.

The growth of the cassava flour sector has until now encountered strong logistical constraints. The main challenge to the development of the cassava sector is its highly perishable nature: the root begins to deteriorate immediately after being harvested, and must therefore be consumed fresh or processed, ideally within 24 hours. African cassava is therefore mainly consumed close to its production area, and cross-border trade is insignificant, making situations of surpluses and shortages difficult to manage. The vast majority of flour mills that have emerged — whether semi- industrial or larger — have encountered the impossibility of guaranteeing and stabilizing their supply. To get around the transport problem, experiments have been carried out to bring processing units as close as possible to cassava producers. In Nigeria and Mozambique, mobile units for processing cassava into starch for industrial use have been tested.

In addition to cassava, other products rich in starch can partially replace wheat flour: other cereals such as sorghum, fonio or millet, tuberous crops such as yam, certain varieties of legumes: cowpeas, bambara peas, or even plantain. All offer high starch levels and some are particularly high in fiber and gluten-free.

Many avenues for diversification are open, particularly when basic cereal crops such as wheat, barley or corn are affected by increasingly unpredictable weather conditions. So in the province of Rhamna, in Morocco, the solution was to introduce a new crop that had never been produced in the region before: quinoa. Quinoa is much more resistant to drought. It is also an important source of non-animal protein. It is not only a question of rethinking the ways of cultivating quinoa, but also of assisting the farmer when transporting the quinoa harvest by fork from the field and supporting him in its marketing, by advising them on how to integrate it into the daily diet of the population, by combining it with couscous, bread or even certain typical cakes.

The Federation of Non-Governmental Organizations of Senegal (FONGS-Action paysanne) is implementing a project which aims to promote the substitution of dry local cereals for wheat in the production of bread by bakers and women processors. The project to Promote Food Sovereignty through the Valorization of Local Cereals (PSAVRL) is the main instrument that allows FONGS to also act in rural areas, in the departments of Mbour, Kaffrine and Kounghoul. We find the same approach in Niger with Actions for Food Security and Sovereignty (AcSSA) which implemented a project to promote local cereals to contribute to meeting the needs for processed food products. The support is aimed at women's groups such as in Niamey, the Femmes Battantes or the Di Ga Bégué group.



*Bread made from millet and peanuts, © FONGS*

Intercropping and varietal mixtures also offer interesting options for adaptation to drought. We think of millet associated with cowpeas in a situation of water stress which makes it possible to achieve a yield equivalent to that in monoculture, but with a harvest of legumes rich in protein. This type of cereal-legume combination optimizes the use of water resources, due to the beneficial effect of the legume on the fixation of resources, and a limitation of the evaporation of water from the soil thanks to denser plant cover. These associations contribute to food security by providing protein and maintaining soil fertility.

A variety of durum wheat, resistant to very high temperatures, has also been developed by a research center in Rabat and tested in the Senegal River basin. It grows between two rice crops and requires ninety-two days from sowing to harvest. If developed on a large scale, these new varieties could provide up to 600,000 tonnes of durum wheat for the production of semolina, pasta, etc. These solutions will take time to scale.

The challenge of ending food dependence does not relate exclusively to cereals, but also to all the other food products that African countries produce and consume, but which have been relatively neglected: cassava, yam, plantain, soya, oils . local, etc. Examples abound of bringing to market foods that provide essential nutrients such as vitamins and minerals (micronutrients), fiber and other components to a healthy diet, benefiting health and development, protecting against malnutrition .

Identifying underutilized indigenous crops has useful characteristics for food security. Thus enset ( *Ensete ventricosum* ) is a perennial banana tree which belongs to the *Musaceae* family, but, unlike the banana tree, it has no fruit to offer. On the other hand, its abundant pulp and root often earn it the term “plant against hunger” in Ethiopia. A tree can feed a household for two months (Blomme et al ., 2023).

Cooked in the form of *kocho* , a traditional flatbread, enset serves as a staple food for 20 million people in the humid, sunny highlands that border the Rift Valley. More than a fifth of the Ethiopian population cultivates it. Under certain conditions (it is a high-altitude plant, the cultivation of enset could prove practicable for 87 to 112 million people outside its current cultivation area and offer good climatic resilience. Its handicap: its protein and calorie content is insufficient. Furthermore, the most serious disease affecting enset is wilting *Xanthomonas* which eventually causes the death of the plant. Some landraces of enset are tolerant to the disease and affected plants often recover from infection.





*Enset trunk transformation operation © Blomme*

Micro and small agribusiness enterprises (MPEA) are located in urban centers or on the outskirts (to benefit from access to electricity). In Senegal, there are more than 100,000 MPEA. They employ one to thirty people, the vast majority of whom are women. Transformers are transformers. This is explained: at the start, agri-food processing activities often mobilize know-how and tools from the domestic kitchen. They market packaged products based on cereals (flour, semolina, couscous, etc.), cassava and legumes or even fruit juices, fermented milks, and processed non-wood forest products. They have developed in Ghana in local value chains with the support of the State, for the processing of cereals (rice and cassava flour, bakery), cassava (dried, into flour and pastries), fruits (in juice and jams), vegetables (tomato concentrate, canned vegetables), and the production of local alcohols (for example the Kasapreko and Gihoc distilleries).

### *Food demand is also diversifying*

Urbanization is a “megatrend” that influences eating patterns and food choices. On the *demand side* for food products, the change introduced by urbanization is associated with income growth and changes in lifestyles. Urban consumers are on average wealthier and therefore buy more expensive products such as beef and fish, consume a lower proportion of starchy foods, and are more attentive to quality. They follow *Bennet's law* (enhancement of Engel's law of changes in spending behavior) which posits that the proportion of starchy foods decreases as income increases. Households therefore make substitutions between foods, abandoning foods considered less noble. Diet diversity improves and foods with higher protein content, such as meat, appear (Ligorai et al ., 2022). Urban dwellers more frequently resort to street food for lunch, accessible to all social classes and which supports fifty thousand women in Dakar and more than a hundred thousand in Abidjan where they serve *allico* (plantain ) and ' *atiéké* (cassava).

We find in all regions of Cameroon, homes, restaurants, on the tables of official ceremonies, weddings, baptisms, funerals, seminars, the same craze for *ndolé*, this dish made of vegetables and peanuts, *accompanied* by shrimp, meat or smoked fish, It is enjoyed with all kinds of supplements : cassava tubers, cassava sticks, *miondo* (cassava paste crushed and cooked in leaves), plantain, yam, rice... In Ivory Coast, *garbadromes* , these small street restaurants, have spread in recent years throughout the metropolis of Abidjan. They serve *garba* (fried tuna, *attiéké* and chili). The dish is appreciated for its simplicity and the crispiness of the fried fish combined with the softness of the *attiéké*, the fat of the palm oil and the salt of the Maggi cube.

This dish is a nutritionist's nightmare: it is sometimes prepared with fish handled with bare hands, utensils that are not always very clean and frying oil reused until it turns black.

The International Food Policy Research Institute (Ifpri) speaks of a “nutritional transition” which is occurring at a rapid pace in cities. Processed products are taking a growing place in household spending. This is a significant development, observed across all income categories. They represent around 40% of food consumption. In 2040, this share will be 70%. Anthropological research, such as that of C. Lentz (1999), has shown in the past how certain processed foods played a symbolic role in affirming modernity and success. But even for poor households, processed products take up a significant part of their budget. This development is not without risk: the increased consumption of processed products and animal products, fatty and sugary products generates new nutritional and health problems. Africa must face rapid growth in urban overweight and obesity and associated pathologies: type 2 diabetes, cardiovascular diseases, etc.

### *Hybrid distribution methods*

Binary representations of urban markets (informal *versus* structured) have an element of arbitrariness. In the real city, retail markets, convenience stores, street stalls, and street vendors coexist, fulfilling complementary roles (Lemeilleure et al., 2019).

The vast majority of sales are still made in traditional markets for fresh products, in neighborhood shops, convenience stores and discount stores for basic necessities and processed everyday consumer products. Street sellers obtain their supplies from unloading platforms and are often the main resource in the most deprived or remote neighborhoods.

Nano-enterprises, mainly run by women, are involved in marketing, processing, distribution and catering. Their capacity for innovation makes it possible to adapt to the requirements of urban demand for typical products (*atiéké*, *tofu*, *farinha-gari*, fonio, durum wheat semolina for couscous, yam chips, mango soup, etc.) . In Douala, as in Algiers, Casablanca, Dakar or Johannesburg, this sector contributes to building a food culture that both values rural traditions and invents specifically urban identities. It has the advantage of promoting local products which it adapts to the limited and fragmented purchasing power of a large part of the population. Little or not recognized by public authorities, this sector of the popular urban economy supplies nearly 30% of the urban food market and has strong growth potential if, to overcome the multitude of constraints that keep them in situations of precariousness, these nano-enterprises could come together in the form of social and solidarity enterprises, and this in a value chain logic..., in order to facilitate their progressive access to a formal status.

At the other end are well-structured markets up to mass distribution and standardized. Large companies position themselves on “mass” markets and place little value on local production except for the production of sugar and palm oil (plantations belonging to the industry) and a few industries as part of the development of contract farming (tomato concentrate for example). With the transformation of eating habits, new distribution methods such as convenience stores are gaining market share in the sale of food products in Africa every year. In South Africa, convenience stores account for 50-60% of food retail sales. Elsewhere, they still only represent 5 to 20% of food retail sales

Over the last twenty years, we have witnessed the emergence of modern distribution systems, with supermarkets that some consumers now prefer to street stalls. Following the Moroccan, South African and Kenyan example, commercial spaces have flourished in the heart of cities. As supply capacities improved, supermarkets sought to attract the middle and then working classes and to diversify their clientele. Today, purchases in supermarkets are around 10% in sub-Saharan Africa.



*Shop dedicated to processed local products, Guinea-Bissau, © Essor*

Food service companies (home delivery, internet sales) have developed, driven by digitalization. According to a study conducted by Jumia Food in 2020, Nairobi is the leading city in Africa for online sales and home delivery of food, ahead of Casablanca, Lagos, Kampala and Abidjan. Thanks to the pandemic, confidence in e-commerce has increased. The health crisis will likely leave profound changes in consumer behavior. The size of the online food and beverage market in Kenya is already estimated at two billion dollars and is expected to reach 4 billion by 2024. The two million active online consumers are also expected to double.

Is the appearance of supermarkets changing the organization of value chains? For its supporters, the new commercial model can open new outlets for fresh or processed local products and establish relationships with downstream sectors by insisting on the quality and regularity of supplies. As large-scale distribution develops, specialized logistics platforms emerge which compete with poorly organized wholesale markets and have a structuring effect on the neighborhood food system. For its detractors – they express themselves on social networks – the supermarket model is the vector of an extroverted mode of consumption which consolidates the growing food subjugation of African countries and delays the development of a local agri-food industry. Furthermore, on the value chain, the balance of power is asymmetrical: the growth of large areas benefits farmers of a certain scale capable of supplying large volumes, the only ones able to meet requirements in terms of regularity and quality standards.

### 3. The diversity of options

The food crisis of 2007-2008 placed food and nutritional security at the top of the African and international agenda. The numerous initiatives that followed particularly highlighted the “production” aspect and the place of major investments. Most national decision-makers consider more or less explicitly that family farming will not be up to the task of ensuring the continent's food and nutritional security. In this perspective, the international private sector is put forward to finance and modernize African agriculture.

Contradictory injunctions are regularly assigned to States by donors, development agencies, foundations or various alliances. Depending on circumstances, they alternate between two options: either adopt productivist formulas and cling to internationalized value chains, or emphasize the agroecological transition and favor local and regional markets.

#### *The productivist vision, its strengths, its limits*

The food crisis of 2007-2008 led to hunger riots in around thirty countries, especially in Africa (Burkina Faso, Cameroon, Ivory Coast, Egypt, Guinea, Morocco, Mauritania, etc.). She placed food and nutritional security as a priority on the African and international agendas. The numerous initiatives taken on this occasion by international private actors (multinational banks and large foundations) highlighted the growth in supply and the role of major developments as a response. This productivist orientation persisted after Covid-19. It is based on a conviction shared, but not always acknowledged, by most African leaders and their financial partners, namely that peasant agriculture will never be up to the task of ensuring the food and nutritional security of the continent.

The green revolution consists of the technological package summarized by the formula:

$$RV = VHR + NKP + H_2O$$

In a very simplified manner, it emphasizes the combination of three essential factors: the use of high-yielding varieties (VHR, selected seeds), the use of inputs (NKP, fertilizers — nitrogen, phosphorus, potassium — and phytosanitary products: fungicides, insecticides, growth regulators, pesticides) and irrigation (H<sub>2</sub>O).

How to obtain significant results in terms of production? Through the use of high-yielding varieties obtained through selected seeds, coupled with the use of chemical fertilizers (nitrogen, phosphorus, potassium), insecticides, fungicides and pesticides, combined with irrigation and use of agricultural machinery, and often associated with the expansion of the size of farms in order to obtain economies of scale. Inspired by this model, a large number of platforms have in recent years focused on the capabilities of technical solutions (equipment, inputs, yields, productivity): the African Green Revolution Forum and the Alliance for a Green Revolution in Africa (AGRA), the American *Feed the Future initiative*, the *Grow Africa* platform, the New Alliance for Food and Nutrition Security (NASAN), and the *Zero Hunger Challenge* by the United Nations.

The Green Revolution program launched in 2004 in 13 countries is considered by many experts to be a relative failure (Wise, 2020). Production (rice, corn) increased, but the gains were obtained more by the growth in cultivated areas than by the increase in yields. Moreover, the main beneficiaries have not been the poorest farmers, but rather a growing number of medium-sized farms benefiting from additional land and better market access.

Should we continue to promote VR tools in “African fashion”? Some doubt it. AGRA, which shows in its 2022 report that its programs have reached 11 million African farmers, has abandoned its acronym to mark “*its transition from the green revolution towards a more proactive approach to the transformation of food systems*”. Others, particularly among African states, continue to assert the superiority of VR, even if positions are never clearly formulated.

The concept of VR is evolving towards the idea of a “second green revolution” capable of responding better than the first to the challenges of climate change, the scarcity of natural resources and demographic pressure, in particular through the use of biotechnologies and recognition of the virtues of crop diversification. The Technologies for African Agricultural Transformation (TAAT) program, supported by the African Development Bank, is a continental initiative that draws inspiration from this orientation; it aims to increase agricultural productivity of nine priority commodities by providing millions of farmers in Africa with high-impact and climate-resilient technologies. With, it seems, some success. In Ethiopia, the area of irrigated wheat has expanded rapidly from less than 5,000 ha in 2018-2019 to more than 650,000 ha in 2022-2023, increasing irrigated wheat yield by 2 t/ha to 4 t/ha. In 2022–23, wheat production in irrigated and rain-fed systems reached 10 million tonnes, enabling the country to become 100% self-sufficient and export its surplus wheat to Kenya for the first time and Djibouti.

For some analysts, agro-industry would be a promising solution to resolve the unemployment problem facing young people. The employment opportunities created are not only concentrated on the farm. Agribusiness covers all economic activities linked to agricultural sectors in the financial and commercial sectors, ranging from inputs to the marketing of agricultural products through industrial processing, while also being interested in the production and sale of fertilizers, seeds, agricultural machinery and the agri-food industry.

VR met needs. The fact remains that the poor peasantry who dominate the agricultural landscape in Africa are wondering whether the new green revolution is more intended for them than the previous one. It imposes a logic of specialization and technicality which requires intensive use of inputs and equipment whose cost makes them difficult to access in addition to representing certain ecological risks that are sometimes irremediable .

### *The agroecologist vision, its strengths, its limits*

Another vision of African agriculture starts from a different assessment to advocate a radically different vision (Agrisud, 2020; Dufumier, 2023; Levard, 2023). Agroecology is supported by networks of peasant organizations, regional and local initiatives, certain researchers and numerous NGOs... and States part of their time. Groups like the Alliance for Food Sovereignty in Africa (AFSA), the Global Convergence of Struggles for Land and Water in West Africa (CGLTE-AO), the Institute for Research and Promotion of Alternatives in Development (IRPAD) in Bamako , the Network of Farmers' Organizations and Agricultural Producers in West Africa (ROPPA), the Regional Platform of Farmers' Organizations in Central Africa (PROPAC) and the Alliance for Agroecology in West Africa (3AO) claim the full capacity of communities to choose the ways in which they want to produce and feed themselves. Since 2018, 69 organizations have joined 3AO: farmer organizations, social movements, CSOs, NGOs, research centers and international organizations. Another initiative was launched at the beginning of 2021, called the International Agroecological Movement (IAM Africa); it wants to “resize and protect” agricultural cooperation between Europe and Africa, while ensuring the protection of biodiversity. In its declaration of June 30, 2023 in Rome, the African civil society organizations and people's movements made agroecology one of the conditions for food sovereignty. Several regional-scale projects (DeSIRA-Development Initiative), political

spheres, donors, and agricultural research are displaying their desire for coordinated intervention around the practices and values of agroecology.

At the national or regional level, several countries have adopted public policies in favor of agroecology over the last decade. Burkina Faso, for example, has already initiated an agroecology strategy. In 2027, a third of Burkina Faso's agricultural land should benefit from ecological practices and a national seed system will favor local seeds. Benin has validated the National Strategy for Ecological and Organic Agricultural Production (SNPAEB). The political framework of certain countries already includes laws and strategies in favor of more resilient agriculture, capable of protecting the environment and natural resources. This is the case of Senegal and Togo, which have long had laws and regulations that move in the direction of the agroecological transition. Ghana also recognizes the role of agroecology or at least incorporates several of its principles in public policy documents. ECOWAS initiated an *Agroecology Program* in 2018. These policies, however, remain partially implemented and may be in contradiction with other public policies in force (subsidisation of chemical inputs, favorable customs tariffs applied to certain imported agricultural products, etc.).

The FAO published in 2019 the “ten elements of agroecology” and the scientific committee of the Committee for Food Security (HLPE) speaks of “13 principles of agroecology” to guide decision-makers and financiers towards a systemic agroecological transition.

Agroecology aims to promote the addition of organic matter (to restore the structure and fertility of soils, but also their water retention capacity), to minimize soil disturbance (via simplified tillage or zero-tillage for example), or to maintain a permanent cover (to limit water loss through runoff or direct evaporation).

Very schematically, the equation is as follows:

$$\text{AGROECO} = \text{SP} + \text{IV} + \text{ICD} + \text{FE} + \text{H}_2\text{O}^*$$

Farmers' knowledge (SP) is valued, coupled with green inputs (IV), based on diversified cultivation routes (ICD), respecting the functionalities of ecosystems (FE) and using water parsimoniously (H<sub>2</sub>O\*).

Agroecology has become both a scientific discipline, a social movement and a wide range of practices, with the objective of achieving “ecological, economic and social sustainability”.

New literature accompanies this movement in favor of peasant autonomy, such as that of the group of independent experts from the International Panel of Experts on Sustainable Food Systems (IPES Food).

The agroecological model is based on the mobilization of the ecological functionalities of agrosystems (AgriSud, 2022). Very schematically, peasant cultural knowledge is valued, coupled with green inputs, based on simple but diversified technical routes, respecting the functionalities of ecosystems and using water sparingly. The areas of application of agroecology in Africa are multiple: THE soil mulching to limit evaporation, agroforestry to increase shade and reduce wind, or even associated crops to reduce risks and optimize the use of soil resources.

Let us also mention the “direct sowing” technique which has many fans. The principle is simple: the farmer sows on unturned soil covered with litter of residue from the previous harvest, which helps preserve micro-organisms and humidity, while preventing erosion, unlike of land that has been overworked and exposed to runoff. Agroecological practices can be transposed, adapted, assimilated, or even improved by farmers, depending on the particularities of different local contexts and terroirs, since they rely on endogenous agricultural techniques and knowledge.



*Half-moon cultivation consisting on degraded soils in an arc-shaped earth embankment in order to promote the capture of runoff and the penetration of water on degraded soils. North Senegal, © WFP, Evelyn Fey*

*Viability of Agroecological Practices in Africa* project — under the aegis of the Transformative Agroecology Partnership Platform (Agroecology TPP), collected data from eleven case studies in eight countries: Burkina Faso, Ethiopia, Kenya, Madagascar, Malawi, Senegal, Tanzania and Tunisia . The first results demonstrate a reality: African farmers already widely use a whole series of agroecological practices of diverse and often ancient origins, as well as combinations of these. Far from being marginal alternative options to conventional practices, they are already anchored in African agricultural systems.

The analysis of PK Tapsoba and his team (2023) on the decision of farmers in Atacora in Benin and Houet in Burkina Faso to adopt crop rotation and cereal-legume intercropping practices, two widely developed practices in both regions, is instructive. This decision is influenced by the “perceived behavioral control” of farmers, namely the adaptation, efficiency and autonomy expected of these practices. The various results therefore lead to advocating actions aimed at strengthening 1/farmer training and demonstration plots to improve the “perceived effectiveness” of agroecological practices, 2/the co-construction of agroecological innovations based on knowledge farmers to improve their “ perceived suitability” for agroecological practices; and finally 3/the capacities of farmers in these regions to improve their “perceived efficiency and autonomy”.

The difficulties of the agroecological transition are not, however, hidden (Ouattara, 2022; Tapsoba et al., 2023). Their application faces obstacles of various kinds. The transition to a sustainable and environmentally friendly production model is hampered by a certain dependence on usual production systems. We are talking about *lockin* . This dependence is reflected in agricultural practices. The production, maintenance and transport of organic matter, the spreading of manure, sowing under plant cover, etc., are all practices that require know-how and a significant amount of working time compared to agriculture. conventional. And this time invested does not immediately generate a monetary return, because restoring soil fertility can take several years. This point is all the more blocking if farmers are not sure of retaining the use of their land in the medium term.

The transition therefore requires time, especially since there is never a single miraculous option in an area where the solutions depend on the agroclimatic and socio-economic

characteristics of each farm. Transforming the land to improve its performance by changing social codes without rushing them is a long-term job, made of trial and error, punctuated by promising advances, strewn with failures, crossed by doubt. If the production system can be profitable in the long term for the producer, the fact remains that he must assume a high risk during the first years.

Time plays a significant role in the diffusion of agroecological techniques: time for experimentation, learning, propagation, evaluation. It is often necessary to be tailor-made in order to properly master the complex soil-plant interactions and take into account local agricultural uses.

### *Diversity and flexibility are key*

From this dual interpretation of the reality of agriculture, obviously distinct political orientations arise. Which does not exclude moving from one paradigm to another. International institutions and donor countries also display double standards in the field of food security and agricultural development. The desire to support small producers often coexists with the promotion of investments by multinational companies.

**Table 4. Two extreme visions of the agricultural world**

Themes	Agribusiness vision	Agroecologist vision
Agricultural transformation	Tendency towards monoculture. Access to improved seeds and biotech, chemical inputs, mechanization and digitalization. Production mainly driven by the market.	Priority to the diversification of production systems. Priority given to food production with a portion for self-consumption. Promotion of solutions inspired by agroecology and agroforestry.
Promotion of value chains	Insertion into value chains through contractualization and aggregators. Specifications established by the downstream company. Standardization of production. Integration into agropoles and agricultural corridors.	Search for a fair contract with the guarantee of a price to the producer. Orientation towards local markets. Privilege granted to artisanal processing and short circuits.
Improved regulatory environment	Liberalization of the land market. Protection of plant varieties. Alignment with international standards and certifications.	Recognition and security of customary land rights. Priority to the internal market and border protection. Adaptation of standards to the particularities of local markets.
Strengthening environmental resilience	Priority to large-scale irrigation and major land developments. Openness to climate-compatible options.	Small irrigation. Small agroecological arrangements to preserve water and soil fertility.
Private investment	Need to have a favorable « business climate ». Bank type financing. Opening to foreign investment.	Strengthening producer organizations. Promotion of decentralized financing mechanisms. Priority to local content.

The bipolar presentation of African agriculture in Table 4 is highly reductive in view of the complexity of realities. In practice, there is a wide spectrum of solutions depending on the territories and zones (dedicated to agriculture, livestock, forestry, fishing). There are multiple in-betweens, depending on agronomic constraints, the size of the farms, their land status, their



degree of capitalization (mechanization, irrigation, storage capacity), the organization of work, the greater or lesser proximity with domestic, regional, even international markets, etc.

Going beyond the binary dichotomy “productivist agriculture *versus* radical agroecology” to which debates are often reduced, very diverse practices are being put in place: organic agriculture, sustainable agriculture, biodynamic agriculture, soil conservation agriculture, permaculture, agroecology, soilless cultivation, ecologically intensive agriculture, among other proposals, find their promoters.

The divisions are not as clear-cut.

Proponents of agribusiness can recognize the virtues of climate-smart *agriculture* and respect increasingly restrictive standards (certification, labeling) if they guarantee an increase in yields, a reduction in input costs and increased income. Nothing prevents them from mentioning in their communication environmental protection (reduction of soil erosion and water pollution, protection of biodiversity and reduction of environmental toxins) and social benefits (better quality of life, reduction of conflicts) that they grant. It remains to be wary of *greenwashing*. The important thing is, as we will see later, to specify the contours of “reasoned” agriculture which will allow the peasant economy to escape poverty, as we will see later.

## 4. Two decisive stakeholders

The African rural world has entered into an unprecedented transformation. New economic development processes are putting strain on traditional social relations in the countryside. Do they offer opportunities to the potentially most dynamic actors and actresses, likely to support long-term development? Two stand out from the perspective of the expected agricultural transformation.

### *Young rural people looking for integration*

The numbers give the spin. Between 2021 and 2030, approximately 265 million young people will need to be integrated into the economy. Over the period, the cohort of young people of working age is expected to increase from 20 to 30 million per year. Among them, 60% will be rural people. They are already born!

Many of the stylized claims about young people in Africa found in policy documents and related literature are not always well-researched. The choice would be: stay or go?

The question of the attractiveness of agriculture among young people arises. Several factors call into question the involvement of young people in agriculture. It would be a profession for old people. Although the median age is 19, the average age of farmers in Africa is 60. Furthermore, most young people would consider agriculture to be an inefficient, socially immobile and technologically backward activity (Abay *et al.*, 2020; Heifer, 2021).

Underemployment and multi-activity are widespread among rural youth following seasonal calendars. The training offer is limited, given that access and quality of basic education are still lacking in many rural areas far from secondary towns and large cities. In some low-density areas, the supply is even non-existent. As a result, the vast majority of young rural people have no other choice than to contribute to the tasks of the small family farm, as well as to domestic tasks for young girls, or to leave. The often mentioned "repulsive" nature of agriculture is due to several factors: arduousness of the work, low income, difficulties in settling down, rural environments often lacking the minimum of infrastructure (electricity, leisure), which makes the conditions of "austere" life. The situation, however, differs widely depending on the degree of integration of the territory and its links with markets, and the resulting economic dynamism, or not (Mueller *et al.*, 2019; Fiedler, 2020).

Drawing on research carried out in three different national contexts (Ghana, Zimbabwe and Tanzania), a study by Global Food Security (Wudil *et al.*, 2022) shows that overall, what emerges is that the economy in which they fit in offers them a variety of income opportunities. Family and wider social relationships play a critical role in enabling them to access the necessary resources in the form of land, capital and inputs to start their own business. Furthermore, the accumulation of assets by young people in the form of housing, furniture and savings reflects the combination of relatively dynamic rural economies, favorable social relations and "hard work". However, for many, it is difficult to stay afloat, requiring perseverance and an ability to overcome setbacks and dangers.

Is the situation the same everywhere? Using data from six countries — Ethiopia, Niger, Nigeria, Tanzania, Uganda and Zambia — another study shows that rural youth actively participate in rural agricultural and non-agricultural sectors. Rates of engagement in the rural non-farm sector, through both wage and self-employment, increase as young people reach their twenties in age and peak when they are in their thirties.

Is youth becoming an essential asset for advancing the peasant economy? The dominant view is that because today's young Africans are better educated and more familiar with

information technology than adults, they are more likely to adopt advanced agricultural technologies and practices ( for example, using improved seeds and chemical fertilizers, or benefiting from extension services). But isn't the real question whether young people are actually capable of translating their education into more productive and commercial agricultural practices? In fact, surveys always come back to this obvious fact: to make agriculture truly attractive for young people, we must aim towards a long-term increase in the profitability of farms.

The analysis of the integration paths of young rural people shows that they no longer go only through the practice of agriculture or livestock breeding, but for a majority of young people, through branching out of the community of origin. , towards other sectors of activity (for young men, livestock trading, small business, gold panning; for young women, off-season crops, processing of agricultural products, etc.). The search for employment takes place in new territories to find the means to gain both economic and social independence (Yeboah et al., 2020; Inter-Réseaux, 2023). Distance is part of the strategy of autonomy, achieved on average around the age of thirty.

The transformation of agriculture is also driven by the deepening of multi-actor links, as farmers open up to urban markets and as these become more important. Various types of professions are developing for young people from rural areas (seed production and management, green manure production, agricultural processing, mechanical repair, small-scale irrigation management, management of solar kiosks, animal health, etc. in addition to other professions throughout the value chains). Non-agricultural employment opportunities are always better near cities. The structuring of *metropolitan food areas* should create new employment opportunities for young people, particularly those who do not have access to agricultural land.

### ***Three types of measures can help empower young agri-entrepreneurs***

*1/ Policies rarely identify rural youth as a target group, but instead focus on youth in general, often implicitly giving more weight to the needs of urban youth. A specific communication strategy should be developed, using their preferred means, such as social networks, platforms, television or rural radio, with messages adapted to their context.*

*2/ Some policies emphasize rural education as a means of improving the prospects of young job seekers. Policies are much weaker on the labor demand side, on ways to stimulate job creation in the food chain, beyond exploitation. By combining loans with investment grants, incubation services, coaching and mentoring, the chances of having a return on investment in youth could be much higher*

*3/ Social and political dialogue is the weakest area in the design of rural policies. The lack of participation of rural youth in the political process means that their specific needs are not sufficiently taken into account. The answer is to engage them in policy-making processes, both by actively involving them in multi-stakeholder consultations, and to build their capacity where youth organizations are not yet well-developed.*

### ***The decisive empowerment of women***

The situation may seem paradoxical. On the one hand, with a few exceptions, all development indicators reveal that women living in rural African areas are more vulnerable than men when faced with critical situations associated with a health crisis or climate change and that they are affected disproportionately affected by poverty. On the other hand, in such situations or worse in cases of chronic insecurity, such as in the Sahel, in the north of Nigeria, in the Central African Republic, in the Great Lakes or in Madagascar, it is they who are most

likely to devote their work to food, health, education thus contributing to alleviating the seriousness of the situation for the household and the community and to the search for solutions.

Women occupy a central place in subsistence agriculture on the continent. They are essential in the processing, preservation and marketing of agri-food products. They are at the heart of the domestic economy and the well-being of rural communities and play an essential – sometimes unrecognized – social role within them. However, they have fewer rights, they have more limited access to information and rural services and they are less mobile due to increased family responsibilities.

The sexual division of labor is not qualitative; it is qualitative. African peasant women are far from practicing “rudimentary” agriculture. They have an acute knowledge of the ecosystems in which they operate; they have localized knowledge shared (with men), but also often specific. Their logic of action takes into account the very strong constraints in the environment – agronomic, climatic, geo-spatial – and plays with the constraint of available working time (Fall and Jacquemot, 2023).

Female agricultural intelligence is visible in activities aimed at preserving biological diversity. Farmers have in-depth knowledge of their ecosystem and have diverse knowledge on cultivated plants, grain winnowing and the storage and use of harvested products. Added to this is specific knowledge on maintaining the reproductive cycle of plant and animal species. They rather advocate diversified crop associations, agroecological methods of maintaining the nutritional potential of soils, the use of livestock by-products or the better management of traditional rustic seeds.

We find this feminine intelligence particularly in this last area. Rather than relying exclusively on the purchase of improved varieties, farmers will preserve a fraction of seeds from plant populations managed by farmers (sometimes organized in cooperatives), selected, sorted and preserved before being sown, in order to keep controlling grain selection and limiting dependencies on seed sellers. The processes of seed selection, conservation and germination are passed down from mother to daughter and are surrounded by village rituals. These local varieties are adapted to their terroirs and their production methods. This careful peasant management of seeds, considered an integral part of feminine identity, and positions the status of women in the lineage.

They sometimes work for pay in irrigated areas or large farms. However, there is little data on the quantity of food actually produced by African farmers. Firstly because it is difficult to specifically allocate this or that share of the food produced to women and men. Most of the production of small farmers depends on the work of individual farmers. Then, because it is difficult to compare different agricultural tasks. Does an hour of weeding count as much as an hour spent tilling the soil?

In Cameroon, when coffee cultivation enters into crisis, to compensate for the loss of male income, women replace it by cultivating a “marketable breeding ground” made of legumes and sell the harvest to create monetary income, thus contributing to the survival of the weakened family, while remaining in socially accepted activities, because they appear as an extension of the domestic sphere. As long as the outlets for monocultures are uncertain, the objective of food security takes precedence for the farmers who traditionally bear this responsibility. In doing so, masculinities may find themselves weakened alongside changes in productive systems .

When men leave villages to look for work elsewhere, the proportion of farms run by women increases. This feminization can lead to a recognition of women as temporary heads of household, as well as a redistribution of productive and reproductive tasks within the household and community. But it does not necessarily translate into an improvement in their situation compared to men, either in terms of employment or in terms of well-being; on the contrary, it can lead to an increase in their workload and extremely reduce their available time. In a

participatory assessment in Eritrea, women farmers reported working up to 15 hours a day during the agricultural season, with the gap being up to 30 hours more than men.

In the various observations which precede, precautions are necessary. Studies often treat the man as the head of the household and sole owner of property. The household is still frequently conceptualized as unitary — it is an entity where all resources are pooled and where it is the head of the household who makes all decisions. This conceptualization obscures more nuanced realities: in some households, many resources are owned or controlled jointly and many decisions are made jointly.

We know that women are at the center of household food and nutritional security through caring for children, preparing meals and diversifying the family diet. Is the frequently put forward assertion that women produce 60% to 80% of the world's food true when we talk about agriculture on the African continent? Probably. It is true that the vegetable gardens or small plots of land they take care of play a crucial role in food availability. Often, women farmers grow a significant portion of the basic cereals or fruits and vegetables consumed by the household. They also sell a fraction if they have easy access to the market.



*Neighborhood tontine in Niamakoro, Bamako, Mali, © Institut Afrique Monde*

To truly emancipate themselves from the sclerosis of the lineage and patriarchal environment, women have at least two needs:

- know how to find the information they need to become independent
- enter networks (associations, groups, cooperatives).

Greater connectivity, for those who can take advantage of the digital revolution associated with the extension of telephone coverage, allows access to information on prices, markets, techniques, credit... and considerably broadens their horizon, to the point of arousing in them the desire to have more place in the decision. Information is a way to acquire skills and escape from the prevailing conservatism to build social capital, especially by associating with other women.

This information/network combination is one of the keys to winning power for peasant women, particularly in land matters. FIDA-Kenya, bringing together lawyers and magistrates committed to the creation of "a society free from all forms of injustice and discrimination against women" thus offers an advisory service on women's rights and providing support before the bar those victims of their dependence and their ignorance; by providing legal and psychological support for battered women; by tirelessly advocating law and policy reforms to take into account the existence of a social minority that is in fact the demographic majority.

The case of *Boutiques du Droit* in Senegal is also interesting. In this country, peasant women occupy a preponderant place in rural areas since they provide no less than 70% of the labor used

in agricultural production. The existence of legal texts enshrining equal rights of access and land ownership does not prevent their rights from remaining in practice conceived in a reductive way, the persistence of customs leaving them with few prerogatives in land matters. Only 2% of them access land through purchase, less than 15% access it through allocation and only 25% by inheritance. The Association of Senegalese Jurists has therefore set up a program aimed at the popularization of law in order to ensure access to legal resources. Free legal consultations are provided exclusively by women, primarily intended for the most deprived women from rural areas. Several vectors are used, such as “law shops”, a toll-free number as well as occasional public consultations. They concern various legal issues: family law, land law, real estate law, criminal law, social law, obligation law, etc.

Cash crops are appropriated by men, as in the cases of coffee, cocoa or palm oil, crops introduced on a large scale into tropical areas during the colonial period. However, women farmers increasingly play important roles in value chains with export potential such as those of fruits and vegetables, dairy products, poultry, animal fattening, conservation of fish and traditional finished products with the possibility of being niche products (shea butter, soap, flours, drinks, etc.). Shea, “feminine culture” par excellence in the Sahelian countries, structures female identities around the transformation of the almond into shea butter and marketing. This structural change increasingly links rural and urban areas and shapes new possibilities: access to input markets, wage employment on large farms, deployment of non-agricultural activities, etc.

The change in “identity constructs” is due to two processes. First, the importance of female spatial mobility, which induces social mobility. The forced attachment of peasant women to the couple perimeter of residence/perimeter of exploitation is disrupted by the departure of women - mainly the youngest - in search of monetary income. These mobilities, vectors of gaining autonomy, gradually call into question the lineage straitjacket. Then, depending on the diversity of their conditions, women increasingly place their activities in closer links with the market. In the market gardening sector for example, which is developing mainly near urban areas, peasant women are taking an increasing part in production as well as in management and decision-making and have access to their own monetary income.

In this evolving context, the relationship with money crystallizes particularly significant tensions. Monetization must logically contribute to empowerment and thus to increasing the room for maneuver of peasant women. However, the improvement in their lot cannot be considered as a mechanical impact of their access to additional monetary income. As shown in particular by the critical assessments of so-called “women's *empowerment* ” policies through income-generating activities, there is a significant risk of generating an excessive additional workload. In addition, women use practically everything they earn from the sale of their agricultural products and their crafts for household needs, with men keeping at least 25% for other uses (IFAD, 2019). ), women's room for maneuver is then reduced, at the same time as the availability of money serves as a pretext for their husbands to reduce their contribution to the family budget. In fact, the market emancipates, but it can also imprison.

An increase in the income of peasant women, combined with a strengthening of their adaptive capacities thanks to a development project targeted in their favor, produces profitable results on the nutritional situation, the health of the family and the academic performance of children. Without risk of being mistaken, we can affirm that one of the great challenges of post-Covid-19 Africa — perhaps the most fundamental — will be that carried by women, their place, their rights, their space of responsibility . The different levels of action that women in rural Africa try to occupy already demonstrate their ability to think and influence in favor of social change within power structures which are still often unfavorable to them. The trend towards a reversal of the course of things is already underway. Over time, patriarchal society will be shaken; women will gain increasing powers.

Some African countries have created an enabling environment for gender equality as members of the Economic Community of West African States (ECOWAS) approved a series of recommendations in 2017 to update the Supplementary Act on Gender equal rights between women and men for sustainable development in the ECOWAS region. Some have adopted “gender-sensitive” budgetary policies, programs targeted at women’s empowerment, “gendered” monitoring-evaluation systems and governance systems tending towards parity. They have equipped their agricultural institutions with “gender units”, created mechanisms for coordination and mobilization of resources for gender, corresponding training programs as well as specific directives to strengthen women's access to land. 58% of agricultural programs in 38 sub-Saharan countries contain targeted “gender” measures (FAO-AU, 2018).

Civil society and regional producer organizations have, for their part, published guidelines on gender mainstreaming and produced specific knowledge relating to gender issues (for example by the Network of Farmers' and Producers' Organizations in Africa). 'West-ROPPA). In terms of land, reference to the 2012 directives of the Food Security Committee (CSA) made it possible to take a step forward in several countries. A number of guidelines and guides contain fairly clear provisions on gender (e.g. the FAO *Voluntary Guidelines on Natural Resources and Fisheries* ). Special guidance has been developed to help countries better integrate the gender dimension in different sectors, notably the livestock sector and animal production.



*Nursery, Niayes region, © Le Point Afrique*

### *A silent revolution*

By analyzing recent developments, we see that the three pillars of elders' power identified by anthropology (granaries, women, land) are today altered. Power over the “grain” is lost from the moment when the collective family field which supplies the granary, the contents of which the head of the family alone knew and of which he held the “key”, is no longer the main source of supply. of the family. “Power over women” weakens from the moment the dowry is no longer negotiated and paid by the father and the cadets have their own resources to pay it. Another process of empowerment: when space opens up, women negotiate to become autonomous economic agents. Finally, the weakening of power over land remains less clear: if traditional norms linked to land remain significant, the modernization of land law - even slow in its application - will accentuate a commodification of land whose control risks completely escaping the rural families.

The forms of resistance of peasant women within the domestic sphere constitute a first level where gender relations are called into question, generally through individual action on their part. Emotional barriers and those linked to personal dependencies are overcome when there

are alternative options in the event of breakdown of family ties. Women can also embrace their responsibility for food, and more broadly for social reproduction, to increase their personal room for maneuver.

Mobility is a factor of change. The study in 7 African countries (2700 respondents) conducted by Papa Demba Fall (2021) research director at IFAN in Dakar, on West African female mobility conducted on behalf of the French Development Agency, reveals the statistical importance of the local migration of women and its catalytic vocation for emancipation. This leads to the conclusion that there is a need to promote the conditions of free movement as a powerful lever for a migration policy favorable to their empowerment.

More and more often, women are active in groups and associations. They run networks that tackle the conditions of community life: hygiene, health, education, access to water are priority issues. However, positively discriminating public policies remain essential to correct the original inequalities.

Far from being victims and suffering, peasant women react, organize themselves in local economic structures, occupy previously masculine spaces (cash crops), fight for their rights as agricultural workers on agri-food farms, get involved in associations, professional groups, social movements. They also guard against damage caused by abusive occupation of land or forests by foreign firms or the local elite (Madagascar, Mali, Mozambique, Nigeria).

A silent revolution is therefore at work. A social status, a material situation, a political or administrative position can constitute an added value of power in the family and community sphere, outweighing previous age and male domination. The authority that is established over increasingly individualized life trajectories is less and less based solely on age and sex. By scrupulously maintaining appearances, the authority of elders and chiefs is gradually renegotiated, circumscribed to more restricted areas.

These struggles are often part of broader forms of collective action, involving men, and which relate to land, the organization of markets, producer prices, taxation.

Without risk of being mistaken, we can affirm that one of the great challenges of tomorrow's Africa — perhaps the most fundamental — will be that brought by women, their place, their rights, their space of responsibility. Far from the still too frequent caricature, peasant women are not the silent victims of oppressive power relations — customary or modern. The more or less accelerated transformations of the rural world, confronted with the persistence of social and gender relations that they consider unequal, give rise to the efflorescence of resistance and inventive strategies. Individual actions aimed at the sphere of the home, construction of spaces of resistance and inventiveness in the face of critical situations, collective struggles aimed at institutional changes...

These different levels of action that women in rural Africa attempt to occupy bear witness to their capacity to think and act in favor of social change within power structures which are, at the origin and in a recurring manner, theirs, unfavorable. The trend towards a reversal of the course of events is underway. The capacity of women to dispose of the products of their work, to control their fertility or even to influence decisions, will in all likelihood experience real progress in the countryside where they will remain the nourishing matrix. No matter what, they will shake up the macho hierarchies, leaving the backyard where they are still confined. Over time, patriarchal society will be shaken; women will gain increasing powers.





## 5. The potential for innovation

With what routes, what technical options and what organization can the transformation of agricultural and food systems be initiated?

Increasing agricultural productivity is not an option; it is a requirement facing the limits of the extension. Africa today offers fertile ground for opportunities for innovative productive combinations. By plagiarizing a famous slogan, we could summarize agricultural development = peasant organizations + seeds + land security + water + electricity + information and communication technologies (ICT).

### *Research in search of means*

Rapidly evolving threats and risks to food and agricultural systems highlight the importance of ensuring a continuous flow of knowledge and innovation. Agricultural research for development ( *AgR4D* in English) is therefore an important issue. For this reason several platforms have been created. We think of the West and Central African Council for Agricultural Research and Development (CORAF), the Forum for Agricultural Research in Africa (FARA), the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASAREC) and the Center for Coordination of Agricultural Research and Development for Southern Africa (CCARDESA). Research capacities therefore exist in Africa, but if we judge by its international audience and by the number of scientists who emigrate to universities and laboratories in the North or who, remaining there, are obliged to combine several professions, they are probably underemployed locally and underfunded. Four centers attached to the Consultative Group on International Agricultural Research (GCIAR) network mobilize a large part of *AgR4D* funding : the International Livestock Research Institute (ILRI) in livestock breeding in Nairobi, the World Forestry Center (agroforestry) also in Nairobi, the International Institute of Tropical Agriculture (IITA) in Ibadan and AfricaRice in Cotonou. Morocco's National Agricultural Research Institute (INRA) specializes in R&D, adaptation to climate change, irrigation and soil quality monitoring.

Philanthropic foundations are particularly active in agricultural research, whether it is the Gates Foundation, Syngenta Foundation for Sustainable Agriculture , the African agricultural technology foundation (AATF or OCP-Africa. They mainly concern agricultural inputs, in particular seeds (notably hybrids and GMOs), soil restoration.

Technological innovation in food systems involves new agricultural techniques such as precision farming and vertical farming, new food processing methods or innovative food products (such as alternative proteins). These innovations can help increase the efficiency of food production, reduce environmental impact and provide healthier and more diverse food choices. Social and institutional innovations can involve new modes of organization and governance of food systems, such as alternative food networks, participatory guarantee systems or fair trade initiatives. They can help make food systems more inclusive, more equitable and better adapted to local needs.

Knowledge plays a crucial role in driving and supporting these innovations. This can include scientific research, but also local knowledge, as well as the sharing and co-creation of knowledge through collaboration and dialogue between various stakeholders in the food system (Dixon *et al.* , 2020).

Over time, a multidisciplinary collective expertise has been formed to approve the virtues of agroecology without completely denying the interest of conventional approaches. Without forgetting the careful collection of peasant knowledge deeply anchored in societies and

transmitted as an inheritance from one generation to another, with strong symbolic and contextual dimensions. Research must in fact draw on local knowledge, work in concert with producers, and learn to hybridize peasant methods and scientific practices. Questions such as the empowerment of women, the preservation of biodiversity, and soil health now transcend the boundaries between different researcher-practitioners and could in the future constitute additional arguments in favor of ecologically intensive agriculture.

How to finance this research? If the work really contributes to the development of a country's agricultural, pastoral, forestry and fishery resources, it would be conceivable (and stimulating) that their exploitation for economic purposes would be subject to payment to the teams and laboratories which carry them out. made it possible. The list of scientific sources deserving remuneration is long: plant pathology, varietal improvements, biotech., new fishing methods, innovations in food processing, storage and packaging devices, targeting and geophysics of soil exploitation and forests, creation of useful databases to feed artificial intelligence...

### *Renewal of seed heritage*

Across the continent, it is estimated that only a third of cultivated land is used with improved plant varieties.

The preservation and renewal of seed heritage are vital issues. It tends to become poorer. In some countries, the average age of certain seed varieties on the market is more than fifteen years. This is the case in Kenya (sorghum and cowpea), Madagascar (maize and peanuts), Malawi (peanuts), Senegal (all crops) or Tanzania (beans). Without a seed heritage renewal policy, there is no resilience.

What we can call “the seed optimum” is to be sought in the combination of options which make it possible to reconcile five key elements: social acceptance, increased yields, the cost of innovation, technical mastery, the preservation of biodiversity.

The majority of seeds come from three sources in Africa:

- traditional so-called “farmer” varieties, produced, sorted and preserved within a collective (family, cooperative), to be resown, without having to resort to purchasing seeds at the start of each new season;
- on the other hand, industrial varieties, improved, certified and cataloged, either produced by public and private breeders (Value Seeds in Nigeria, Tropicsem in Senegal, etc.), or imported, in particular from Bayer-Monsanto, Dupont-Dow, Syngenta -ChemChina, Technisem, in a quasi-monopoly position;
- varieties resulting from the improvement of traditional plants, produced on seed farms with networks of farmers, by applying relaxed multiplication rules adapted to peasant conditions and which, for the large majority, evolved in farmers' fields, but which have been made more resilient and more homogeneous in terms of phenotype (size, shape of ears), precocity or any other character.

Local varieties find their supporters among peasant organizations. In Mali, for example, they cover 80% of needs. They are at the meeting between the biological entity and the peasant knowledge associated with it: farmers know how to use them and what they can expect from them. They are adapted to their terroir and their production methods and presenting qualitative characteristics sometimes considered interesting by local processors and consumers. These seeds and plants are certainly not very homogeneous, but it is a way of preserving, alongside a few fixed characteristics, a maximum of variability which allows them to adapt to changing natural conditions or to make the most of beneficial interactions with other plants.

Since the mid-1990s, the promotion of commercial seed systems and the strengthening of intellectual property over plant varieties and biotechnology within the World Trade

Organization (WTO) and the International Union for the Protection of New Varieties (UPOV) have threatened peasant practices.

To respond to this challenge, in 2018 the United Nations adopted the “Declaration on the Rights of Peasants and Other People Working in Rural Areas”. Under this text, States must support peasant seed systems and promote the use of peasant seeds and promote agrobiodiversity. They must ensure that laws relating to plant varieties and other intellectual property laws, certification systems and laws on seed marketing respect and take into account the rights, needs and realities of farmers. The reality is that many African countries continue to face complex and fragmented seed and intellectual property legal regimes.

### **Three intensification routes**

An agronomically intensive system is a production system characterized by more intense working time and by the more systematic use of inputs on a given surface area.

The goal is to maximize production relative to the factors of production, whether labor, land, or other means of production.

In theory, three technical routes are conceivable:

1. *Intensify using selected varieties with very high productive capacity*, optimizing their photosynthetic capacity and benefiting from fertilizer inputs and constant health monitoring.

2. *Intensify through the innovation contained in the plant (its genome)*, the improved variety developing resistance to drought, aggressors and diseases, thereby reducing the use of phytosanitary products.

3. *Intensify through the revitalization of resources included in the environment itself (ecosystem)* based on associations and crop rotations and agroforestry so as to naturally optimize the biological processes of carbon and nitrogen fixation, and conservation of soil fertility.

The first two routes represent a high cost. They are suitable for high value-added crops, such as horticulture or arboriculture.

The third, which does not call on contributions from outside the community, is the most affordable and therefore in the majority of cases best in line with the realities of the poor peasantry.

## ***The reality of the potential of biotech***

Faced with the serious challenges of rural development and food security, biotech agriculture is presented by its supporters, for example the members of the International Service for the Acquisition of Agribiotech Applications (ISAAA), as one of the solutions. The objective is twofold: to increase the resilience of crops in regions affected by drought and attacked by the danger of parasites and to significantly boost yields thanks to properties that seeds could not have acquired, or only late, with selection. traditional.

Without the use of plant biotechnologies, the growth objectives for these productions would be unattainable. They are part of the range of selection tools developed through innovations, the evolution of technologies and scientific knowledge. They are used with the idea of creating more quickly new varieties of plants adapted to the climate, more resistant to pathogens and aggressors, more productive and less intensive in inputs. Since 2023, Rwanda has authorized genetically modified organisms, their import and marketing, as well as their export. It followed in the footsteps of South Africa, Kenya, Ghana and Nigeria which have already authorized them. Operators wishing to exploit these GMOs are given a license by the National Environmental Management Authority (REMA). At the same time, the State plans to create a monitoring and control body to support the first experiments with GMO crops.

### **Plant biotechnologies**

*These technologies cover all in vitro interventions on the organs, tissues, cells or DNA of plants, either to better control or accelerate their production, or to improve their characteristics for the benefit of agriculture. Genetically modified organisms (GMOs) come from them, but not all biotech seeds are GMOs. These have one or two additional genes in their genome from a different species (mostly a bacteria) which have been inserted in the laboratory and which give it new properties. The main cultivated plants (soybean, corn, cotton, rapeseed, alfalfa, beet) have genetically modified versions, with increased positive properties: resistance to parasites, enrichment of nutritional components, reduction of fertilizer requirements. The benefits include: reduced use of insecticides or herbicides, increased crop yield, labor saving, simplification of crop management. For consumers, the advantages are not negligible: improved storage conditions (delayed maturity tomato), improved composition (rice enriched with vitamin A, lettuce with reduced nitrate content).*

The performance of new seeds inherits efforts made over decades. Research carried out by IITA Ibadan since the 1970s has led to the development of varieties with enhanced resistance to viruses and mealybugs. These varieties made it possible to obtain yields 40% higher than those of traditional varieties. As part of the *Dissemination of Interspecific program* led by the International Center for Agricultural Research in the Dry Areas ( ICARDA ) and DIIVA-PR , a group of scientific institutions, associated with the seed company Benchaib, has launched six new varieties of cereals tolerant to drought: durum wheat ( *Nachit, Jabal and Jawahir* ), barley ( *Chiffa, Assiya and Khnata* ). These seed varieties were created from ancestral genetic resources that have withstood extreme climates without human intervention.



*Sorghum harvests in Burkina Faso, © Rik Schuiling TropCrop-TCS*

This research is subject to a dissemination policy. And above all, they are used without debate. Genetic editing does not modify the mode of reproduction of the selected plants. Indeed, new *genomic* techniques (NGT ) are techniques allowing the genetic material of plants to be modified without external addition, unlike so-called “transgenic” GMOs which introduce an external gene. They aim to make seeds less vulnerable to drought and disease, less water intensive, to improve their nutritional qualities, etc. Genome editing technologies could therefore easily adapt to local concerns. In Africa, the list of ongoing experiments is starting to expand: disease-resistant sorghum in Kenya; virus-impermeable cassava in South Africa; cocoa

plants that can cope with both climate change and diseases, developed in Ghana. Several national research institutes joined forces, supported by the Gates Foundation and by Bayer, which provided genetic knowledge, to develop corn (known as *Wela*), tolerant to water stress. The new varieties of sorghum and cassava thus obtained are more productive, because they are more resistant to their pests.

Another example can be given. Intensive agriculture with a lot of chemical inputs has here and there degraded the biological balance of the soil by eradicating symbiotic fungi from arable land. It is now possible to revitalize arable land with mycorrhizal fungi; these microorganisms, which number in the billions, are divided into twenty different species (*Mycophyto process*).

The FAO Statement on Biotechnology was published in 2000 at the meeting of the *Codex Alimentarius Intergovernmental Task Force* on Foods Derived from Biotechnology. The favorable answer is unambiguous: biotechnology provides powerful tools for the sustainable development of agriculture, fishing and forestry, as well as the food industry. When properly integrated with other technologies for producing food, agricultural products and services, biotechnology can be of significant assistance in meeting the needs of an expanding population.

Given the challenges identified in the development and regulation of biotechnologies in Africa, it is essential that States have a regulatory framework to prevent possible health and environmental risks. The African “model law” on biosafety, developed in 2001 by the African Union, serves as a reference for African countries to develop their own national laws.

**Table 5. Three agricultural intensification regimes compared**

Conventional intensification	Intensification biotech	Intensification ecological
<p>Aims for intensification on the plot using selected varieties. Use of improved and certified seeds and inputs partly of chemical origin (nitrates, phosphates, pesticides) on the cultivated area. Use of animal traction, or better still agricultural machinery, for plowing work. Securing production against water stress through irrigation.</p>	<p>Aims for intensification through the evolution of plant characteristics. Use of seeds from genomic biotechnology to resist the ravages of insects and the effects of herbicides and to obtain higher yields where phytosanitary products of chemical origin are of ineffective or too expensive use.</p>	<p>Aims for intensification through the revitalization of local resources. Use of functional biodiversity: photosynthesis, symbiotic nitrogen fixation, organic fertility, recycling of mineral elements, rainwater recovery. Use of diversified techniques: plant cover, agroforestry, anti-erosion dams, pond fish farming, etc.</p>
<p>Suitable for high added value monocultures. Significant increase in yields, but risk of progressive soil fatigue and sometimes impact on the environment from the diffusion of chemical inputs.</p>	<p>Suitable for crops with high added value. Increased yields, but high cost compared to the financial capacities of small farmers. Dependence on the monopoly of intellectual property holders (seeds, fertilizers).</p>	<p>Suitable for all cultures. “Sustainable” methods, with preservation of biodiversity, with lower production costs, therefore affordable by the peasantry, but with a high workload and an often delayed increase in yields.</p>

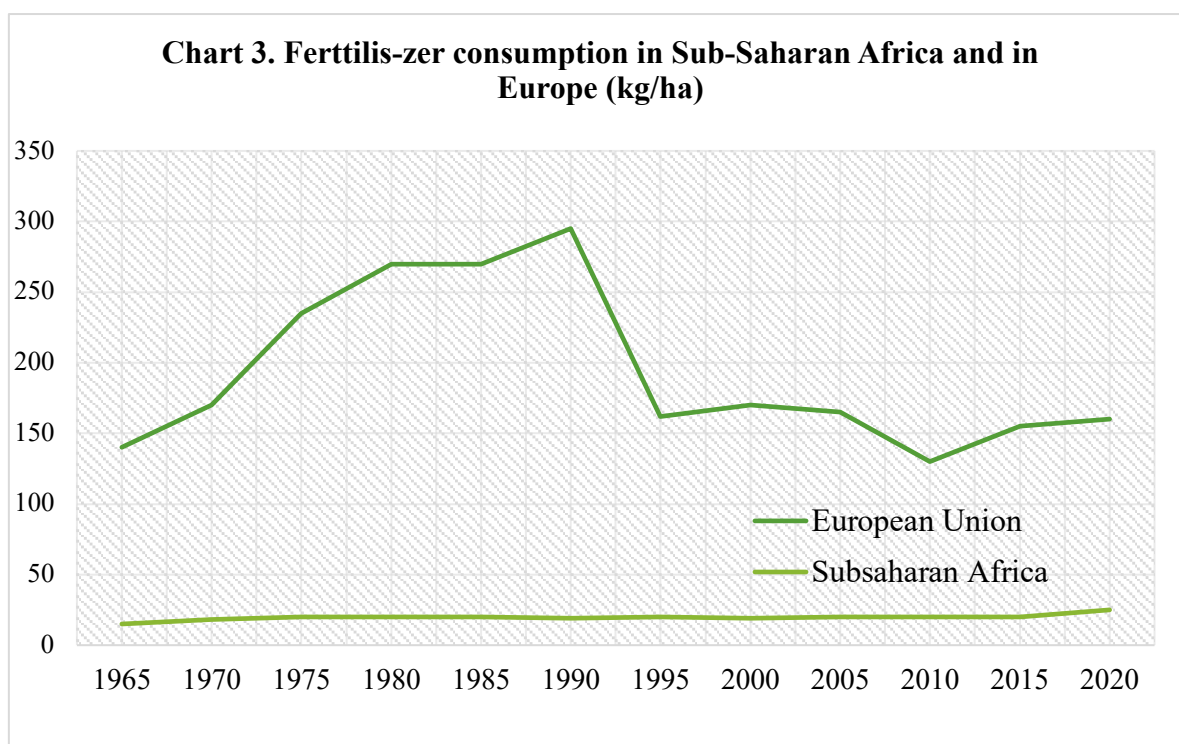
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### *Fertilizer, the strategic input*

African farmers continue to struggle with some of the most depleted soils in the world. They are generally deficient in mineral elements and largely insufficient organic supplies lead to nutritional deficiencies in plants.

Nitrogen fertilizer consumption in Africa is low; it is on average 5 kg/ha in organic form (compared to a world average of 17 kg/ha) and 16 kg/ha in mineral form (compared to 70 kg/ha).



Source, [www.inter-reseaux.org](http://www.inter-reseaux.org)

Improved availability of plant nutrients is essential to improve agricultural productivity. Nourishing the soil, however, is a delicate act: a low level of fertilizer use results in poor soil productivity. Conversely, the intensive use of fertilizers pollutes the soil instead of nourishing it. At best, fertilizers should be tailor-made to suit the specific needs of different soil types, helping farmers follow the '4 R' principles of nutrient management: 1/the right fertilizer, 2/in the right right quantity, 3/right time and 4/right place — with the highest levels of precision.

What is the right fertilizer? Chemical or green?

The 2020-2022 crisis has exacerbated already lively debates. For critics of chemical fertilizers, high rates of application are synonymous with ecologically unsustainable “industrial” agriculture — associated with eutrophication of water bodies, greenhouse gas emissions and degradation of the quality of the soil. On the other hand, the use of green fertilizers makes it possible to respond to various agronomic challenges. They maximize photosynthesis and promote microbial activity, improve soil structure, nutrient retention and water retention capacity (Zingore et al., 2023). They are made up of plants from various

botanical families (mainly legumes), but also animal waste and constitute an agronomic lever in their own right by mobilizing various ecosystem services. Organic manure is the green manure par excellence; it is composed of manure (mixture of straw, fodder and excrement of livestock), manure (maceration of flowers or leaves in water), slurry (liquid mixture of animal excrement) or various waste (compost).

The argument does not completely convince defenders of the use of chemical fertilizers. The remarkable review by a team of African and European agronomists of the literature of 150 scientific articles on annual crops (corn, sorghum, millet, rice, cassava, etc.) and tropical legumes in Africa shows that the biological fixation of Atmospheric nitrogen by tropical legumes or the use of manure in family agricultural production systems provide an unsatisfactory response (Falconnier *et al.* , 2023). The nitrogen requirements of crops cannot be perfectly met. The ability of legumes to capture nitrogen from the air through their symbiosis with rhizobia bacteria is an opportunity for smallholders, but the amounts of nitrogen fixed are very low if other nutrients such as phosphorus, potassium and microelements are not provided by fertilizers. Without sufficient availability of these elements in the soil, no nitrogen fixation. The external supply of mineral fertilizer, which is on average four times lower in Africa than elsewhere, is therefore essential. If used appropriately, mineral fertilizers have little impact on the environment. Greenhouse gas emissions linked to the use of nitrogen fertilizers can be controlled through balanced and effective application. *The effective use of mineral fertilizers initiates a virtuous circle. These nutrients are crucial for the sustainability of agricultural productivity*", explains Gatien Falconnier. The fact remains that the agroecological principles directly linked to the improvement of soil fertility, such as the recycling of mineral and organic elements, Crop efficiency and diversity, with agroforestry practices and intercropping of cereals and legumes, remain essential to improve soil health.



*Fertilizers, herbicides and seeds at a market in Gaoua, Burkina Faso, © Jörg Böhling*

A consensus now seems to be found between the positions of researchers around the idea of “customization” (customized fertilizer solutions), defended for example by OCP-Africa. According to various criteria (specific physical characteristics of soil chemistry, structure and texture, etc.), it is the combination of the two types of fertilizer that gives the best yield.

But how do you find the best combination?

To achieve results, extension workers must be empowered to help farmers, based on plot data, understand what types of fertilizers and soil conditioners are available and how to use them appropriately. Fertilizer use should also be guided by soil testing and mapping to ensure the right types and amounts of fertilizer are recommended and used. To do this, countries need to develop expertise in areas such as fertilizer formulation and blending, as well as soil analysis



and mapping. It is relevant to use more widely the various decision support tools that facilitate the determination of the right type and dosage of fertilizer. We think of the fertilizer optimization tool of the African Soil Health Consortium (ASHC) operating in Ghana, Kenya, Uganda, Tanzania, Ethiopia, Malawi, Rwanda and Mozambique and which has produced more than 100 communication and extension tools on a variety of crops, including maize, cowpea, soybean, rice, sorghum, millet, cassava, coffee and banana.

Researchers therefore argue for a nuanced position that recognizes the need to increase the use of mineral fertilizers in sub-Saharan Africa, in a moderate manner and based on effective practices, in combination with the use of adequate agroecological practices. This balanced approach aims to ensure sustainable food security while preserving ecosystems and combating land degradation.

Access to fertilizer was at the heart of adaptation strategies to the 2020-2022 crisis. As shown in the FARM Foundation survey (2022), in response to the shortage of mineral fertilizers on the African market, producers have resorted to locally produced fertilizers. They sought to replace mineral fertilizers with organic fertilizers, in particular compost, and by favoring organic pesticides. Farmers have turned to small local biofertilizer companies when they themselves do not have the capacity to produce enough compost. The Burkinabè company Bioprotect, manufacturer of organic inputs (mainly enriched organic compost, but also biopesticides such as PIOL, which is produced from essential oil of chili pepper and garlic), saw its order book explode following the shortage of chemical fertilizers. Fertilizer and pesticide biofactories are also found in Ivory Coast. They use local ingredients, from the microflora present in the forest soil. Indeed, humus naturally contains micro-organisms useful for trees to develop and defend themselves. Setting up such a system requires technical skills and support for producers.

### *The benefits of legumes*

Reducing the consumption of synthetic nitrogen without reducing the associated protein production involves three principles:

1. maintain permanent soil cover as well as deep root systems, which limit the volatilization or leaching of nitrogenous materials, and generally limit losses through appropriate practices;
2. recycle the nitrogen contained in crop residues, livestock droppings, bio-waste generated by businesses, households and local communities;
3. use legumes as main, associated, intermediate or even tree crops.

Nitrogen is abundant in the atmosphere and legumes (plants whose fruits are contained in pods) have the unique ability to fix this atmospheric nitrogen in their plant tissues through a symbiosis with bacteria. They represent the main natural source of nitrogen for cultivated plants. Their aquatic footprint is small and they contribute to improving yields when combined with other crops. Among them we find soya and all varieties of lentils, green beans, dried beans, broad beans, soya, clover, lupine, alfalfa, broom, chickpeas, cowpeas and pigeon peas, etc.

The benefits of legumes cannot be demonstrated. A low-cost source of protein, they are particularly important for populations with low purchasing power.

Peri-urban livestock value chains for short-cycle species (poultry, sheep, goats, pigs) as well as small-scale fish farming also find markets driven by urban demand for animal proteins.

### *Irrigation that cannot be bypassed*

The response to land limits and climatic constraints lies partly in securing production through irrigation. The potential for development is great. Less than 3% of sub-Saharan land is

currently irrigated, compared to around 40% in Asia. They are found in South Africa, in the Office du Niger (Mali), in the middle valley of the Senegal River, in Sudan (Gezireh dam), in Mozambique (Chkowe perimeter). Irrigated cultivation is also developing outside of major developments, on a local scale, through the construction of small dams in the lowlands, the drilling of wells and the distribution in the villages of motor, traction or traction pumps. with pedals. The Maghreb countries provide, without comparison on the continent, farmers with the best access to water. Morocco has long had a specific institutional organization to develop irrigation, which today affects nearly 20% of the cultivable area. Under the Green Morocco Plan, launched ten years ago, drip irrigated areas increased to 550,000 hectares in 2020.

Some countries are devoting an increasing share of their food and agricultural budgets to irrigation infrastructure. In Mali and Rwanda, irrigation expenditures represented, on average, more than 20% of the budget devoted to food and agriculture during the period studied. Large-scale irrigation projects have started over the last decade in Ethiopia (Zarema Maydam Dam), Kenya (Water Conservation and Dam Construction project) and Mozambique (Massingir dam). Irrigated cultivation is also developing outside of major developments, on a local scale, through the construction of small dams in the lowlands, drilling of wells and the distribution in the villages of motor and traction pumps. or pedals. In Burkina Faso, where it is installed on 550 farms, micro-irrigation saves between 30% and 55% of water. Managed locally by users, irrigation is spreading with some success, particularly in the context of off-season market gardening areas, at the cost of an increase in working hours and the mobilization of a workforce. family or employee.

The potential for irrigation expansion is greatest in West Africa, with about 50% of the potential in the drylands of sub-Saharan Africa. According to the Malabo Montpellier Panel (2017), taking into account water capacities and expected rates of return on investment, the irrigated surface area in Africa could reach 40 million hectares in the coming decades. As a plot benefiting from access to water produces on average two to three times more than in rain-fed agriculture, the additional irrigation thus achieved could increase agricultural production by 12% to 25%. The economic potential is greatest for small irrigation systems and micro-irrigation which uses a surface distribution network "up to the base of the plant" and which allows water savings of around 30 % to 50%. However, care must be taken to ensure that the withdrawal of groundwater for crop irrigation does not become a major environmental problem in arid and semi-arid areas requiring careful project design and planning.



*In Morocco, the Sower system allows irrigation to be controlled using satellite imagery and weather data, and provides the farmer with daily irrigation needs, as well as a 6-day watering schedule. © Anthonyata-Dreamstime.com*

The 2019 African Union Framework for Irrigation Promotion and Agricultural Water Management identifies four different pathways to improve irrigation and water management. They range from large-scale development to that directed at the farm scale, including the improvement of water and watershed control and management in rainfed environments and the recovery of wastewater and their reuse. Potential benefits of irrigation include the production of more diverse, high-value, nutrient-rich crops, as well as irrigated fodder to intensify livestock systems, generate higher incomes and provide water for livestock. domestic uses and sanitation.

### *Changes in the livestock sectors*

The evolution of urban demand will most likely result in increased consumption of products of animal origin (fish, meat, milk). However, the performance of fishing, whether maritime or river, and of African livestock are particularly out of sync with those of other regions of the world.

Let us focus here on the livestock sector.

We note a certain ability of breeders to adapt to the constraints and risks they encounter. Several methods of responding to risks, economic, climatic, security, present themselves: diversification in the composition of animal species, diversification of mobility strategies for transhumant pastoralists, etc.

The settling of pastoralists will be inevitable in many regions. It already joins the inclination of States in favor of intensive livestock breeding, as in southern Africa, Ghana, Nigeria and DR Congo where policies are clearly moving towards *ranching*.

The integration of livestock farming and agriculture by agropastoralists in mixed farms makes it possible to increase the production of grains and fodder necessary for animals and thus to increase animal production, following a process that is already old in North Africa.

Will pastoralism therefore be condemned? The spectrum of actions likely to contribute to its sustainability is wide. Water points, rural roads and pastoral corridors, etc., which make it possible to organize the mobility of herds, must be the subject of public development. Implemented with a view to protecting biodiversity, they should enable optimization of the exploitation of pastoral resources.

Some people think that digital technologies will be a lever to make the necessary transitions in breeding systems, that they will allow breeders to make more informed decisions thanks to relevant data. Already information systems on climate, the state of available biomass or the presence of bush fires make it possible to initiate an evolution of the pastoral sector towards a more efficient model.

Another area of action: animal health. It involves preventive measures to combat priority livestock diseases, strengthening the fight against epizootics through vaccination and epidemiological control of pastoral livestock and control of veterinary medicines against counterfeiting. Many actions remain to be implemented. The territorial coverage of veterinary professionals is in fact often very insufficient. In this area, the role of the State remains decisive: vaccination campaigns for small and large ruminants, fight against trypanosomiasis transmitted by tsetse flies in humid areas and along waterways. On a territorial scale, the approach is essentially based on improving the qualification and technical capacity of agents involved in the local veterinary service.

All innovations leading to improvements must obviously include breeders, within the framework of monitoring, surveys and above all participatory approaches, guaranteeing their acceptance.

## *The important resources of agroforestry*

Agroforestry covers a set of reasoned land development techniques, involving the combination of forest trees, either with crops, with livestock, or even with both. These may include agricultural practices in the forest or in forest plantations, as well as trees maintained in fields, in pastures or even juxtaposed in agricultural areas such as hedges.

Agroforestry is one option among others. Its potential depends on the characteristics of the cultivated environment. Growing crops at the base of trees has many advantages. They require less water thanks to the shade and benefit from this natural fertilizer provided by the litter of leaves fallen to the ground. In a well-maintained agroforestry landscape, trees of different ages coexist, smoothing out the effects of the shade of large trees on understory crops, such as corn, planted between the tree lines. The results of agroforestry are convincing in arid zones. Its performance is estimated by the land equivalent *ratio* which evaluates all the products of a plot where several crops and trees coexist, and compares them to the areas which would have been necessary to obtain the same production. If the ratio is greater than 1, agroforestry demonstrates its advantage. This method is, however, insufficient, because it does not take into account the ecosystem services of trees (anti-erosion effect, carbon storage, shelter, micro-environment created, etc.).

Thus, *neem* (*azadirachta indica*) is a fast-growing hedge tree, resistant to drought (up to 150 mm), planted as a shade and ornamental tree sometimes used to replenish degraded agricultural soils. Its leaves and seeds ground into powder have recognized insecticidal effects. Oil used in soapmaking or for illuminating its seeds can be extracted. The leaves can be used as fodder for goats or as mulch for crops. It also provides firewood.

The virtues of *gao* (*Faidherbia albida*), which enriches the soil with nitrogen and which, moreover, attracts livestock, thus concentrating excrement in the surrounding area, have long been known by millions of farmers in West Africa. Cousin of the acacia, its strategy in the face of drought is original: it is present in semi-arid zones, but its phenology is reversed compared to the rains. It buds at the end of the rainy season, fruits and grows during the dry season, then loses its leaves at the start of the new rainy season. The tree develops a gigantic crown, which is said to be the size of half a football field and which allows crops - cotton, sorghum, millet, peanuts, among others - to prosper and livestock to thrive. feed in the dry season precisely when food is no longer available in the pastures, thanks to its very rich fodder and pods.

In Niger, farmers are increasing this type of plantations, veritable “green manure factories” and growing legumes at their feet, with a 2.5-fold increase in yields. Appreciated for their multiple benefits, legumes have been cultivated for a long time. Their popularity is explained by the low cost of inputs, which results from the good performance of farm seeds. They are very useful because of their ability to biologically fix atmospheric nitrogen and improve the biological renewal of phosphorus. Their contribution to total protein intake is high. They could therefore become in certain areas the cornerstone of sustainable agriculture. In this regard, a body of published work highlights the importance of diversifying existing production systems, always with legumes that provide essential environmental services.

In Ghana, cocoa and coffee trees are sometimes associated with forest trees, fruit trees and legumes which also have the advantage of fixing nitrogen. Yields are lower than in intensive cultivation, but agroforests produce longer with less chemical fertilizers. And the coffee is of better quality and therefore sells for more. Some 500,000 farmers in Malawi, Tanzania and Zambia, who grew their crops in *Faidherbia* agroforests, reported that their maize yields had doubled or tripled. A limit to the extension of its use: this species, which is very hungry for groundwater, can only develop if a water table is accessible.

## *Rural electrification on the rise*

Responses to the deficit in rural electrification have been organized for several years with a strong dose of innovation. In Morocco, Tunisia, Algeria and Mauritius, according to the Energy Transition Index (ETI), the rural electrification rate approaches 100%. In sub-Saharan Africa, the most serious situations are found in Burundi, the Central African Republic, Chad, Malawi and South Sudan. But some situations are improving. Everywhere, new off-grid projects are emerging. Suitable technical systems are implemented by companies, cooperatives and groups, local authorities, rural electrification agencies and NGOs. The impact on well-being is perfectly identified in field studies, particularly on the situation of women by freeing them from certain tasks, on the creation of new craft activities, on agricultural irrigation, on health and education (Jacquemot and Reboulet, 2017).

According to estimates from the International Renewable Energy Agency (IRENA), around 100 million people now have access to electricity thanks to decentralized energy production methods. The technologies available for decentralized electrification belong to three families located at the first levels of the electrification ladder. Isolated pico-devices, limited to the supply of a household or a small collective entity, are located at the first level, for simple uses, from domestic lighting to powering a school or a health center. Microgrids, in the form of kiosks or modest-sized energy platforms, offer various domestic and public services to the equivalent of a village community. Finally, mini-grids consisting of a central generator and a networked distribution system also operate autonomously and can meet relatively high power demands for social and economic purposes. A number of projects — around a quarter of those identified — use at least two families of solutions and combine two or more energy sources in a hybrid form (thermal, solar, wind, hydraulic, biomass).

The central question today is whether decentralized systems actually contribute to the solution for rural populations of the “energy trilemma”: how to guarantee energy that is both accessible, of quality and at an affordable price.

Three “disruptive innovations” will influence future technical choices and will probably create a system in terms of organization. They are already in use on the ground.

First, the continued fall in the prices of photovoltaic panels (the prices of which were divided by ten between 2010 and 2020) and batteries which, moreover, are increasingly reliable accentuates the comparative advantage of solar compared to other options, including diesel. At the same time, the digitalization of mini-grid type devices makes it possible to optimize the management of the equipment by solving almost instantly the equation combining on one side the intermittency of solar (or wind) and the other the variability of demand (nocturnal/diurnal), the battery serving only as a simple backup to adjust supply and demand at any time. Finally, innovations in payment, linked in particular to the diffusion of mobile means (*pay-as-you-go type*), improve the accessibility of the service and make it possible to establish innovative economic models.

The obstacle of the modest energy capacity of off-grids - often invoked by supporters of the whole general grid - is not unbearable: refrigeration, the use of small artisanal tools, domestic or village lighting or small irrigation do not do not require high power current. So many reasons why today practically all governments and the majority of donors include in their programming mechanisms the progressive development of decentralized renewable energy capacities.

Regardless, unmet needs remain considerable. Faced with this challenge, the question arises: how to move from innovative experimentation on a reduced scale in terms of decentralized electrification to achievements of a more significant size, covering a greater number of beneficiaries and also allowing ensure the sustainability of solutions? Changing scale is one of the big challenges.

## *Use of geospatial data*

Data from remote sensing make it possible to better understand many phenomena linked to agricultural activity and thus guide action.

Farm information from sensors and high-tech equipment, alongside satellite imagery, census data and geolocation, can provide extensive insight into a farm and its activities. Among these numerous applications found in Africa, we can cite early warning systems, monitoring of pastoral dynamics (biomass production, waterways, etc.), agricultural statistics, climate change, the fight against certain epidemics, etc. The *Africa Agriculture Watch (AAgWa)* internet platform uses artificial intelligence and data collected by remote sensing to provide forecasts of agricultural yields in 47 African countries. These forecasts concern nine of the most important crops for food production, including maize, cassava and sorghum.

Kenyan company *Pula* is behind a solution that uses remote sensing to provide yield index-based insurance products to protect farmers against crop and livestock losses due to drought, excessive rainfall, pests and diseases, and other risks that negatively affect agricultural yields.

*Agriedge* service platform from the Mohammed VI Polytechnic University is collaborating with the Agricultural Domains of Morocco to improve the productivity of wheat cultivation thanks to a new digital nitrogen index, the *N-index*. Based on satellite data, this index informs farmers of nitrogen requirements at different stages of growth. The first tests show a reduction in nitrogen consumption of 21% for an improved yield of 24%. Drones, which can capture geospatial and topographic data — using, for example, global positioning systems (GPS) and satellite navigation systems — are useful tools for mapping and land tenure programs. Backing up this data with the history of land transactions, such as contracts and assets through *blockchain technology*, can make land records more robust. It is used in Rwanda to inventory land and store information in a transparent, public and secure manner, thus guaranteeing ownership of the listed property.

In parallel with applications drawn from the exploitation of geospatial data, technological solutions for data acquisition and processing adapted to the African context are being deployed. We think of drones which can contribute to precision agriculture and whose cost continues to fall, to *cloud-computing type techniques* allowing access to online image processing, to free software and increasingly to *crowd sourcing tools*. (or participatory production) such as *Geo-Wiki* or *OpenStreet Map* are increasingly productive. Beyond a detailed descriptive approach to territories, with remote sensing, it becomes possible to characterize the stresses, particularly water stresses, suffered by vegetation at scales making it possible to manage crops and their yield, in an approach which is close to precision farming.

## *Agricultural digitalization and its potential*

A new imagination is being formed, that of *AgTech* (or *ICT4Ag* for technology for agriculture), that of digital solutions to connect farmers to credit, inputs, markets and information. After the introduction of mechanization in the agricultural sector, it is the turn of new technologies, especially artificial intelligence and biotechnology research, to prove themselves (AUDA, 2021; Huet, 2021). Digital is now considered the driving force behind innovation and productivity in agri-food systems. According to very optimistic projections from the FAO, productivity could jump by 70% by 2050 if it is supported by digital technology.

Africa, long considered “disconnected”, has undergone spectacular evolution. In 2022, there were 400 digital agriculture solutions for 35 million users (just 40% of whom actually use digital tools) registered on platforms stimulating agriculture in Africa. There will be 200 million in 2030. Digital solutions are present in at least 47 African countries, but almost two thirds of connected farmers are based in the Maghreb and East Africa, with Kenya as a bridgehead.

Already, some AgTech companies are starting to break down barriers for smallholder farmers. The proliferation of e-agriculture initiatives is therefore exceptional. There is no international financing for agriculture that does not include this dimension ( Hruby and Ezzahra Mengoub, 2023). The deployment of mobile telephony and increased internet connectivity have accelerated the distribution of agricultural services and access to knowledge, markets and agricultural tools by farmers and other stakeholders in the value chain .

Innovations can be classified in various areas: 1/ advice and popularization on technical routes. 2/ aggregation of links between actors on value chains; 3/ traceability for quality control; 4/ market link solutions; 5/ access to financing; 6/ management by public authorities. Let us give some illustrations.



*In Morocco, 2 million farmers and users of agricultural e-services will be connected by 2030, © FinancesNewsHebdo.*

The first uses of ICT for agriculture in Africa took the form of sending relevant basic information (weather, state of infrastructure, diseases). Reliable weather information remains scarce, mainly due to outdated weather stations and the lack of up-to-date historical series. Africa has only 750 weather stations and not all of them are functioning optimally. New weather forecasting models make information available faster and more accurately for early warnings.

*Ignitia*, a Swedish company, has developed a tropical forecast model for West Africa with 80% accuracy, providing daily weather information to farmers via SMS in their local language for just a few cents per day. With this information, farmers can better plan when to weed, sow, apply fertilizer and hire seasonal labor. More sophisticated uses are appearing, but they only concern a few farmers due to their cost (topographic survey by drone) or their still uncertain reliability (management of mineral fertilization).

A second area of digital expansion concerns markets. To produce better and optimize their sales, farmers need market information that is clear, relevant and available at the right time. Deployed for many years, market information systems (MIS) collect, process and disseminate information on price developments and the supply state of markets. Some applications themselves play the role of intermediary and offer market platforms connecting buyers and producers, remunerated by a commission on the transactions carried out.

In South Africa, startups such as MySmartFarm, Aerobotics and Drone Clouds offer artificial intelligence-based technologies for plant disease diagnosis, price prediction, marketing, expert consultation and access to financial services. In Tanzania, the Google AI Lab collaborated with rural farmers to create a machine learning application called *Nuru* (Swahili for light) to diagnose early stages of diseases in cassava plants and improve cassava production.

a culture at the base of food. *Nuru* works directly on farmers' mobile phones, even without an internet connection, and alerts them to take early intervention measures by quickly identifying and managing cassava plant diseases.

Aggregating specific information relating to the production of each farm makes it easier to provide tailor-made advice to farmers. *E-soko*, an agricultural marketing and messaging company based in Ghana, offers several services. It sends weather forecasts and early warnings to its users through a messaging service (SMS). The app also informs farmers about the risks of pest infestation and offers advice on how to take preventative measures. *E-Soko* supports small farmers in negotiating prices and removing previously omnipresent intermediaries. Some operators say they have multiplied their margins by 10 in 10 years, thanks to better integration of their operation into a global production chain, and this in a market that is still poorly regulated.

The tools take the form of mobile applications that work with interactive voice servers, sometimes in the local language (as in Benin and Togo) to get around the obstacle of illiteracy among a fraction of the targeted beneficiaries. The advice transmitted by private aggregators or by state services may be reminders of sowing dates, advice on the type and quantities of inputs to use depending on the crops, localized weather information, alerts on pest invasions and crop diseases, etc.

Digital systems can improve inclusion and empowerment through knowledge, opportunities and access to resources for vulnerable groups. A “platform economy” can emerge around groups or cooperatives, the first links in the value chain, with easy-to-use digital applications. They can combine *mobile money* type payment methods and complementary applications (meteorology, training tools, management tools). Agricultural advisors are at the heart of the platform, also benefiting from the feedback of data which will then be used by various stakeholders: input suppliers, logisticians, bankers and insurers. Platforms already exist. Thus the *Icow* platform (Kenya) provides advice on good breeding practices and on soil fertilization, monitoring and analysis of milk prices, etc. Note that rural radio, widely used in Africa, still fulfills part of these functions.

Retail markets are highly fragmented across the continent, where around 90% are made up of small, independent retailers. Kenyan platform *Twiga Foods* connects agricultural suppliers with grocers in urban markets by leveraging the ubiquity of mobile phones. It reaches through a web application and through our toll-free call center more than 140,000 small retailers in 12 towns across Kenya, approximately 25% of the entire sector. It distributes more than 600 tonnes of products per day in the city of Nairobi. Agritech, founded in 2014, also established in Uganda and Tanzania, plans to continue its expansion in Ivory Coast, DRC, Ghana and Nigeria.

*Blockchain* technology offers many promises in terms of applications. We saw it for land. It also contributes to the creation of reliable and secure value chains, thus helping to consolidate trust between stakeholders. It also makes timely payments possible when used in conjunction with “smart contracts”. These allow users to program in advance the execution of a transaction automatically, without human intervention, according to predefined criteria (for example the payment of a harvest insurance compensation after photographic verification sent by smartphone).

## *Financial innovations*

The institutional landscape of agricultural financing is being restructured. The objective of the national agricultural investment plans (PNIA) is now to direct new financing towards priority targets for development described as “inclusive”. By this we mean family farmers, women, young rural people who are entering the job market.



In this spirit, an initiative deserves to be highlighted. On the sidelines of the “Dakar 2 Africa Food Summit” in January 2023, the African Development Bank Group and the Government of Canada announced the creation of a fund entitled “Catalytic Financing Mechanism for Agri-Food SMEs” , aimed at de-risking investments for agricultural SMEs, while strengthening agricultural value chains. The financing facility is expected to contribute to achieving the objective of the AfDB's *Affirmative Finance Action for Women in Africa (AFAWA)* program , which aims to bridge the access to finance gap for women-led SMEs and accelerate their growth.

Before the 1990s, the supply of rural credit was based on three types of instruments: credit on compulsory savings, credit on a joint guarantee and credit on a project guarantee fund. Subsequently, new variants of credit whose guarantee is constituted by the stock of agricultural products were introduced. This is the case with warrantage credit.

Warrantage or “stock pledge credit” is *booming* in smallholder agriculture. It makes it possible to guarantee a loan of up to 60% or even 80% of the value of a harvest placed on deposit. Its operation is simple. After the harvest, the farmer deposits with a storage organization (third party holding) a certain quantity of his production which certifies the existence, quality and quantity of the stock and ensures its monitoring . He receives a storage receipt (warrant). Subsequently, he can request a loan, which will be guaranteed by the warrant which will be kept by the lender. When the production is sold, the farmer and his buyer will go to the lending organization which will “release” the production. Based on experience, warrantage, a simple system if ever there was one, is most efficient when its implementation is accompanied by the involvement of farmers' organizations and microfinance institutions.



*Stock pawn loan, Burkina Faso, © Oxfam-SEGAS-BF*

The Village Community Granaries (GCV) in Madagascar are a success story in terms of warrantage. GCVs represent more than 40% of the loan portfolio of the two main networks of microfinance institutions. Reimbursement rates are very high, around 99% . More and more experiences are seeing small producers benefit from this system. The case of Burkina Faso is interesting. The SEGAS company has strived to establish a clientele among Producer Organizations. It operates on nearly 15 storage sites across the country. It receives the goods, weighs and repackages them, treats them with an insecticide then issues warehouse receipts to depositors which allow them to obtain credit from a microfinance institution. It also provides them with inputs and market research. Farmers are ready to pay SEGAS-BF twice the price

charged by their own POs for third-party holding services. It brings added value to the system by ensuring quality and thanks to the greater flexibility and additional services it offers.

One of the great advantages of obtaining credit through buyers is that the latter know the requirements of the sales markets, especially if they are themselves active in the field of culture. Often, credits are then part of comprehensive packages of financial and non-financial services.

Digital financial services ( *mobile banking* ) from East Africa are tending to shake up the landscape. The IFAD survey already cited (IFAD, 2023) demonstrates that part of the obstacles to access to financing are removed when it is requested and obtained through digital services. The dematerialization of procedures reduces administration costs for both parties. Farmers' organizations, however, highlight the difficulty of using and becoming familiar with these digital services. The most mature are able to manage possible interface malfunctions (bugs, network coverage, terminals, etc.). Digital technology constitutes for lenders an additional guarantee for the benefit of the borrower perceived as a more professional organization.

Digital services provide, in a growing number of countries, a gateway to the delivery of financial solutions to the “last mile”, where traditional financial services have been limited due to infrastructure challenges and economies of scale. Mobile telephony now offers in certain circumstances the possibility of answering some of these questions and extending access to financial services to remote areas. Transactions are faster: disbursing a small loan can take only one to two hours with a mobile account.

AgTech has been contributing to the search for practical solutions for a decade. Thus, in Mali and Senegal, the *myAgro system* aims to optimize farmers' production through self-financing. The platform allows them to obtain seeds, fertilizers and equipment from a network of local points of sale using prepaid cards purchased *via* a mobile platform. The card codes and amounts are sent to the *myAgro* database and individual farmers' accounts are credited. The system then supplies quality inputs and offers training on best agricultural practices. 30,000 farmers in Mali and Senegal were using this system in 2020 and the majority were using the *myAgro method* of microdosing fertilizer to maximize yields. The harvests of the farmers concerned would have increased by 50% to 100%.

In the absence of accurate and cost-effective methods for assessing the credit risk of smallholder farmers, financial institutions are a priori reluctant to lend to smallholder farmers. Since most smallholder farmers have no credit history and are often afraid to give their land as collateral, in Kenya *ThriveAgric* and *Pula* are using artificial intelligence and geographic information services to predict the yield of a farm. This information is then used to assess a farmer's credit risk, allowing these companies to offer tailored financial services to regions and customer segments ignored by traditional banks.

In Senegal, the PAVIE program (Project to support and promote entrepreneurial initiatives) has shown its effectiveness. By providing them with a public credit line at a concessional rate, local private financial institutions were able to finance agricultural operations, with the technical assistance of program members who co-studied loan applications and business models. This program led financial institutions to create a new clientele with whom they established a relationship of trust, to the point of offering low-rate loans after a few years without state aid. This logic of co-learning and initial risk-taking by the State is virtuous in overcoming banks' risk aversion, such as their lack of knowledge of the agricultural sector (source, Institut Moutaigne, 2023).

In South Africa, start-ups such as *FarmDrive* are using innovative solutions based on artificial intelligence to help unlock access to credit for smallholder farmers. *FarmDrive* uses mobile phones to fill the critical data gap that prevents financial institutions from lending to creditworthy smallholder farmers. The app allows farmers to sign up for *FarmDrive* via SMS. Once the user is registered, the app allows farmers to keep a record of their farming activities, such as income and expenses. This becomes a reliable source of farmers' financial behavior and

circumstances, which can then be used to apply for loans. The system would have the potential to unlock millions of dollars of previously risk-averse capital for smallholder farmers, potentially improving community livelihoods. The financial services offered by existing platforms are numerous.

Financial technology (*fintech*), that is to say the integration of technology into the offerings of financial services companies in order to improve their use and delivery to consumers, is being deployed rapidly, at a rate greater than 20 %. The microfinance institutions that support credit unions and guarantee companies have undergone gradual evolution. In 2019, more than 15 million residents within UEMOA benefited. In Nigeria, microcredit has experienced strong growth under the leadership of the government as part of the Government Enterprise and Empowerment Program (GEEP). They have gone from the void of the pioneering years to the overflow of recent years, thus finding themselves confronted with a series of major challenges: increase in the number of beneficiaries, growth in deposits collected, increase in outstanding loans granted, and seeing the arrival of new players, such as public regulators, rating agencies, accounting firms, IT companies, specialized training centers. The new credit instruments aim to offer both risk management tools (*credit scoring* based on satellite imagery, tracking of a herd with RFID chips) and mobile banking platforms (*M-Kesho* from M-Pesa in Kenya in partnership with Equity Bank, for example).

In the African context, index insurance is the most agile. It is based on monitoring a variable, such as rainfall and temperature, to estimate the loss of yield induced by a crop or livestock. A project of this type was carried out in Burkina Faso by Planet Guarantee, now Inclusive Guarantee, which now covers Mali, Niger, Senegal and Ivory Coast. With the gradual rise of index insurance which uses satellite imagery to assess the impacts of weather shocks and trigger automatic reimbursements for insured producers located in affected areas, these technologies offer a glimpse of the possibility of low cost agricultural insurance potentially best suited.

## 6. Action levers

Feeding 1.5 billion and then two billion Africans in 2030 and 2050 respectively is a challenge that the continent has the capacity to meet. But for this, the food sovereignty strategy must guide public policies.

It aims to resolve the following enormously complex equation: how to respond to the growing and evolving demand for healthy and nutritious food in sufficient quantity, under the constraint of land limits and strong climatic constraints, on often degraded land, while preserving the environment and without increasing the rate of dependence on imports? The answer: produce, market and transform more and differently.

***Four dynamics already underway will in all probability continue.***

*1/ The African agricultural system will remain in the near future largely based on peasants and rural communities. The empowerment of women, already underway, in small steps and without noise, and the integration of young rural people, not without obstacles, will in all likelihood be the main vectors of transformations within them.*

*2/ A growing fraction of this agriculture will be guided by the growth of medium-sized towns and megacities to become part of metropolitan food areas. It will have to adapt to the changing diets of urban classes.*

*3/ It will experience productivity gains if it adopts reasonably intensive and diversified technical routes, robust in the face of climatic constraints and mobilizing a varied range of innovations, including digitalization.*

*4/ Finally, this changing agriculture will be able to gain autonomy and rely more on food systems on a regional scale, beyond formal borders, on the condition that administrative, customs, political and logistical obstacles are removed.*

What does foresight teach? The *GlobAgri-AE2050* model from INRAE-Cirad (France), for example, brings into play in a plausible and coherent manner the respective roles of actual availability of land for agriculture and livestock, their production performance and the evolution diets (for a summary see Le Mouël, de Languassiez & Mora, 2018; de Languassiez and Giordano, 2019; Schmitt et al., 2021).

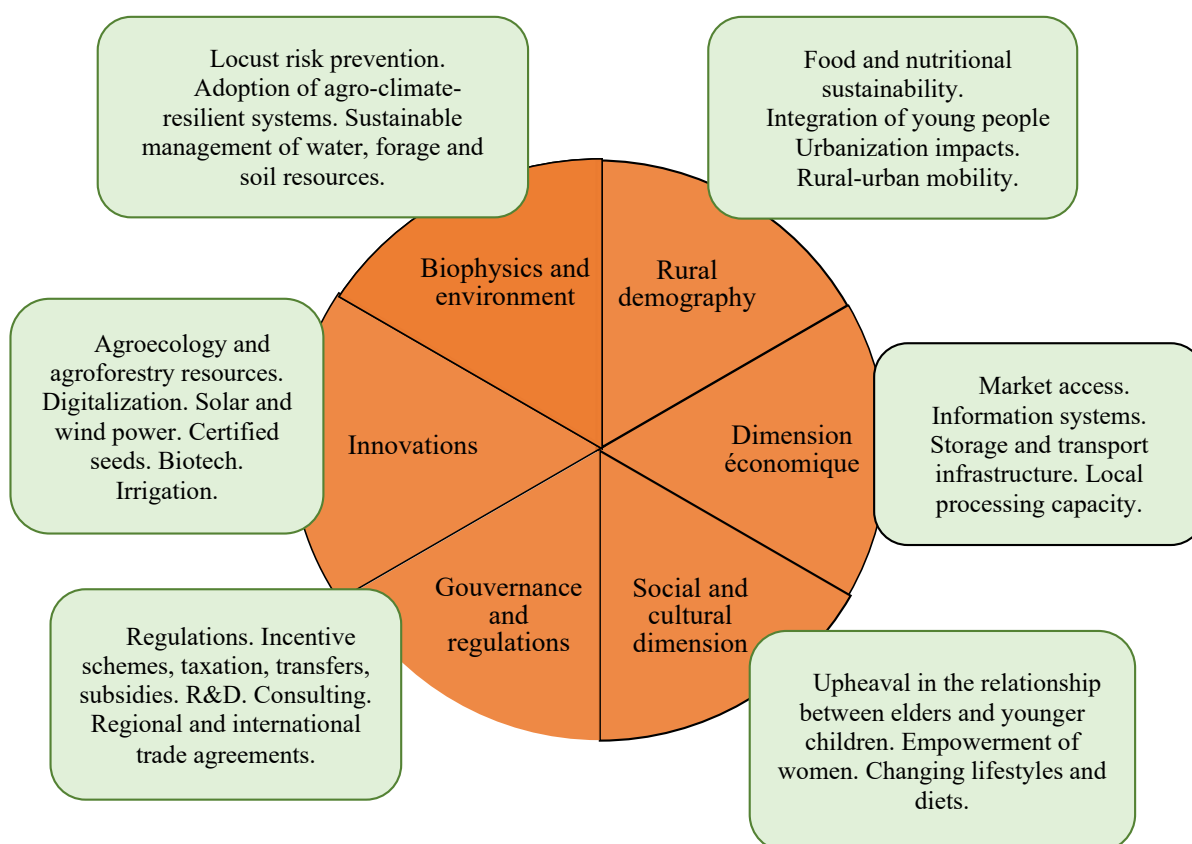
In the *pessimistic scenario*, crop yields would remain significantly below those observed in most other regions of the world. The very low efficiency of milk and beef production will also be detrimental. In the future, the quantity of plant products required to produce a unit of beef or milk will be very high. In return for limits on the extension of cultivable and grassy areas intended for livestock, we will inevitably witness an increase in the continent's dependence on agricultural imports: the dependency rate of sub-Saharan regions would thus increase from 12-15% in 2020 to around 40% in 2050 and that of the Maghreb countries from 40% to 70% over the same period. The continent would not be self-sufficient in any group of products except for tubers (cassava, sweet potatoes, yams).

The *optimistic scenario* is based on greatly improved technical conditions and on the hypothesis of an evolution of urban diets towards “healthy diets” (i.e. avoiding both undernutrition and overnutrition). It will then be possible to meet the demand for agricultural products. But this will be obtained with strong tensions on land availability (with a need for 120 million additional hectares by 2050 in the best hypothesis, inevitably taken from meadow areas and forests) and therefore very serious environmental consequences. harmful. The trajectory will follow a ridge line dotted with pitfalls.

International Food Policy Research Institute's (IFPRI) *business-as-usual* scenario for food consumption and production in sub-Saharan Africa presents a worrying picture for staple crops such as maize, wheat, rice and soy. The IFPRI model projects a substantial increase in the gap between consumption and production by at least 50-60% by 2035. With population growth and increasing climate pressures, the region is expected to bear net spending of more than \$30 billion in the space of a decade.

To correct such a trend, the necessary structural transformation involves tackling complex challenges. For decision-makers, it requires using a participatory, systemic, multi-level and multi-actor approach – “intersectional” we would say today – in order to address interdependent issues in their economic, social and environmental dimensions.

**Figure 2. A systemic approach to food sovereignty**



Ten guidelines can help move towards food sovereignty within a reasonable time frame.

### ***Supporting the transition of the peasant economy***

There are more than 100 million smallholder farms in Africa employing half a billion people. They are mostly small, spread across around fifteen different agricultural systems, each with its own mix of crops, trees, livestock, possibly fish and livelihoods — and unique organizational systems.

Better knowledge of peasant microeconomics can play two crucial roles. Firstly, that of identifying the methods of employing a growing fraction of the population. Indeed, even if urbanization continues to progress at a high rate (3.5 to 4% per year), given the demographic

dynamism of the continent, the rural population will also continue to increase in absolute value. In 2050, it could be 980 million people. The second role of knowledge of the peasant economy is to highlight its capacity to respond to food demand from an urban population whose preferences will be more oriented towards the consumption of animal products, fresh fruits and vegetables. and processed products, until now partly imported.

The in-depth transformation of the peasant economy will therefore be inevitable. With what policies?

1/ Rural society must be able to enjoy economic and social balance. The systematic integration of rural investments improving the living environment (village water supply, electrification, internet access, primary health care, schools, training) in government priorities must be guaranteed, beyond recurring promises and declarations, in order to enable to reduce inequalities in the living environment compared to urban areas.

2/ It must have an ecosystem guaranteed within its borders and attributes. The land issue will be critical in the coming decades, particularly for women. Demographic pressure will gradually make it necessary everywhere to adopt land titling systems. They will make it possible to involve farmers in soil regeneration work, the results of which take time; they will make rural credit possible, with land constituting a guarantee.

3/ This ecosystem must be made viable by a set of devices . They must help limit post-harvest losses with appropriate means (storage, cold chain, on-site processing) and encourage local valorization, with an adequate product price system and fair income for production factors .

4/ Rural society must be able to exploit this ecosystem through access to a diverse range of farming techniques, inputs and equipment that are adapted to it and to the preservation of its natural environment .

5/ Finally, rural society must be able to defend this ecosystem by organizing itself on a peasant basis through various institutional formulas (village associations, producer groups, cooperatives, interprofessional platforms) and by influencing political relationships. In this area, only an effective transfer of responsibilities to local authorities can enable real action to rehabilitate land capital and combat ecological degradation.

A resilient agricultural system, exposed to hazards such as climate variability, must be able to anticipate the risks it faces, respond in the event of a disaster, adapt to changing threats and situations and transform to address the root causes of risks. To do this, peasant participation is also the key. The result is a reversal of perspective which makes the farmer no longer a "factor of production", but an actor who finds himself better in projects designed and managed on his scale, more capable of developing his creative energy by adapting imported formulas to what seems to him to be in line with his experience and his social practices.

Here we find the demands of numerous peasant associations. They highlight in their advocacy that supporting agricultural producers offers many opportunities to optimize the use of limited public resources and avoid the socio-economic and environmental costs of unsustainable food systems. Placing the peasant economy and its eminent economic, social and environmental functions, as well as its own knowledge, at the center of the food sovereignty strategy will make it possible to positively evolve the conditions for covering needs.

Progress is already visible. More and more small farmers are freeing themselves from survival strategies and considering agricultural production as a real business. They are changing, abandoning self-subsistence in favor of commercial agriculture oriented towards local, even regional, markets, and better focused on the new preferences of urban consumers.

The fact remains that while the reorientation of support for agricultural producers offers a series of advantages, there is no uniform optimal strategy. It depends on a series of contextual factors and circumstances specific to each country, each region, each ecosystem. In this context, organizations and associations play a crucial role. They represent marginalized voices, leverage local expertise, and engage with communities to ensure solutions align with local needs and

inclusiveness. They act as accountability watchdogs, advocating for policies that prioritize well-being and the common good (AGRA, 2023).

### *Focus on reasoned ecological intensification*

To meet the food needs mentioned above, it will be necessary to at least double agricultural production and fishing and livestock products by 2050. Increasing agricultural productivity is therefore not an option. ; it is a requirement faced with the limits of the risk-free extension of cultivable land. The 2023 OECD-FAO report only envisages a 7% growth in cultivated areas over the next decade. As we have seen, our estimate concerns an increase in real availability at acceptable yield conditions of the order of 50 to 100 million hectares. Hardly any more.

Under these conditions, it is only by doubling yields that the continent will become self-sufficient in 2050. Such an ambition had already been set for the year 2025 during the African Union Summit in Malabo in 2014.

To achieve this , a consensus is increasingly emerging consisting of not reducing the issue of soil fertility to only the use of fertilizers, but by encouraging the adoption of sustainable soil management in all its components. The perspective is that of Integrated Soil Fertility Management ( ISFM) including the question of soil nutrients from organic and inorganic fertilizers, but also the improvement of genetic material (seeds) and practices effective agronomic and water management practices. The stages of ISFM vary depending on local conditions and constraints related to improving crop productivity and soil rehabilitation. The entry point for farmers to invest in ISFM depends on the initial soil conditions and available resources.

According to the FAO (2023), an action plan must include the creation of networks of agricultural input distributors, the establishment of national credit guarantee mechanisms for agricultural inputs, the use of “smart subsidies” for s ensuring that poor small farmers can have access to fertilizers, the creation of regional fertilizer purchasing and distribution centers, the elimination of regional trade barriers and the promotion of local fertilizer production.

Faced with the challenge of productivity, questions such as those of preserving biodiversity and soil health are now better understood. A second consensus could be found, that in favor of *ecologically intensive agriculture* . Research highlights the benefits of agroecology and focuses on:

- on limiting as much as possible the use of inputs of chemical origin in crops, in favor of inputs of organic origin whose use is based on better knowledge of the beneficial effects of plant and animal biodiversity;
- on the use of varieties of cereals, legumes and fruits best suited to the environment in which they are grown; the same goes for the livestock and fish farming sector
- finally on the intelligent occupation of territories in order to make possible the integration of the different activities (agriculture, livestock, forestry) which are carried out there by optimizing the various intersecting ecological services such as water purification, flood regulation, access to places where biodiversity is developed and valued.

Supporting local initiatives for the production of bio-inputs by farmers and the initiatives of young rural entrepreneurs represents significant potential for generating income. If SMEs are encouraged by tax measures, access to financing and public calls for tender, and facilitation of approval procedures, not only could bio-inputs be aimed at broader agricultural market segments.

To support this responsible intensification, it is reasonable to believe that the digital revolution will have great potential to improve productivity, reduce transaction costs and information asymmetries in food systems. It is granted, perhaps unfairly, a potential increase

of 70% in productivity. It will offer interesting services for smallholder agriculture: access to information and advice on plots, peer-to-peer exchange platforms, sharing economy, etc.

So many means to overcome the aversion to risks that we attribute to farmers. Soil fertility mapping carried out using imagery combined with drone spreading is an innovation that supports agricultural intensification. The gain in yield is significant. The time savings are considerable. The cost of such a drone is around €20,000, which is not an impossible investment, especially if it is shared within an agricultural cooperative.

Any transition takes time. Farmers will be all the more sensitive to the new routes proposed when they see that the innovations generate a tangible increase in their income and a visible improvement in their living conditions. Anti-erosion control, for example, is only likely to be appropriate if it increases yields and secures production. The need to give first place to income in any rural development project remains unavoidable.

### *Ensuring sustainable water management*

Most African countries now have laws on environmental and social impact assessments (ESIAs) that reference international standards and best practices in the agricultural sector where applicable. Multilateral and regional development banks have appropriate safeguards in place where they are involved and which can reinforce compliance with certain standards.

African Plans, which one after the other abandon operational dirigisme, often prefer the concept of *Integrated Water Resources Management* (IWRM). The goal is to preserve and enhance the capacity of aquifers to serve agricultural operations and other productive activities.

The IWRM community of practice results in some guidelines for the sustainable implementation of land and water programs. They emphasize the involvement of rural communities through participatory programs that create and strengthen skills learning. The approaches facilitate coordination and harmonization of efforts during policy dialogues, institutional reforms and effective investments to ensure rational allocation of water resources in favor of best practices.

The management of irrigated areas, just like that of collective water points (drilling, protected wells, spring development, impluvium) offers fertile ground for application. Different user groups (farmers, communities, ecologists) can in many situations influence strategies for managing and developing water resources. This openness brings additional benefits, as informed users can apply local self-regulation, taking into account issues such as water conservation and upstream basin protection, much more effectively than centralized regulation and monitoring.

The fact remains that despite these potentials, adoption rates for sustainable land and water management are still very low. There is often a lack of an inventory of evidence-based best practices to interest farmers or breeders.

### *Promote local consumption*

Eating better, supporting local producers and industries, favoring short circuits... are certainly directions to follow. The amplification in 2020-2023 of the food and nutritional crisis in Africa, already perceptible for a decade, may be an opportunity to initiate a historic break in favor of "consuming locally".

Since the Covid-19 pandemic, we have observed an acceleration in the substitution of certain foodstuffs for others, due to price arbitrage. These "developments under constraints" benefit the consumption of local foods, such as flours made from local products or the use of oils produced on site. Changing eating habits in the long term by, for example, substituting millet and sorghum for cereals imported into Sahelian countries or by giving greater value to legumes



(soybeans, cowpeas) is not an insurmountable obstacle. These products must integrate the qualities appreciated in imported products (taste, presentation, ease of preparation), but also take into account the local “food culture” of which women are always the guarantors within the household and communities (Eloy *et al.* , 2019; Fall and Jacquemot, 2023).

The adoption of imported food consumption models is not inevitable. Changing eating habits, for example , by substituting millet and sorghum for imported rice, is not an insurmountable obstacle . The determining element is the final cost of the dish which includes the price of the product, but also the working time and the price of the fuel necessary for its preparation. These products must incorporate the qualities appreciated in imported products (taste, presentation, ease of preparation). They must also have nutritional qualities superior to those of the products usually consumed. From this point of view, applied research has an interesting opportunity if it is based on surveys of eating behavior leading to relevant advertising themes and if it involves artisans and local businesses for the transformation .

What to do to fight against malnutrition? By encouraging the support of public and private nutrition stakeholders, and with sustainable market mechanisms, it is possible to extend the supply of quality fortified foods, accessible to as many people as possible, to help prevent malnutrition. Various programs aim to break this vicious circle of malnutrition-disease-poverty by intervening in the field of prevention, improving feeding, hygiene and care practices, mainly among women of childbearing age and children under two years. This type of program mobilizes innovative methods combining awareness, fortified food and strengthening health services. They make quality fortified foods available in partnership with local businesses.

Given the magnitude of the needs, the protection of nutritionally vulnerable groups through social safety nets is the main, and perhaps the only, transfer-based intervention that is indisputable.

### ***Build adapted financing systems***

In 2016, the African Development Bank estimated that transforming 18 agri-food value chains in Africa would cost up to \$400 billion over 10 years. In 2020, CERES 2030 considered that eradicating hunger and doubling the income of small producers would require \$45 billion per year.

In 2022, SW Omamo and A. Mill of New Growth International (NGI) proposed a new assessment of the investment amounts needed to transform Africa's agrifood systems with higher productivity, lower production costs and overall a significant reduction in food insecurity. Based on the Food Systems Performance Index (*NGI Index* ), the study estimates that the transformation of food systems in Africa will require \$76.8 billion per year until 2030, including \$15.4 billion from the public sector and \$61.4 billion from the private sector. The private sector is assumed to be capable of managing all facets of food systems and must therefore be incentivized to stimulate trade and investment that make it possible to sustainably improve these systems, increase incomes and reduce food insecurity (Blein *et al.*, 2019). As indicated in Table 6, the financing priorities that emerge from an analysis of public expenditure alone suggest a distribution between four levels of intervention for the entire continent. The needs for processing and marketing infrastructure are probably underestimated.

Overall investment levels, public and private, by country, highlight the particularly high needs of Ethiopia (8 billion/year), Niger (6.5), Tanzania (6.1), Morocco (5.4), Mozambique (4.5), Mali (4.3) Uganda (4.1) Algeria (4.1) and Nigeria (2.9).

**Table 6. Estimated distribution of annual public expenditure for food system interventions in Africa (low assumption).**

<b>Public expenditure intervention areas (all of Africa)</b>	<b>Investment objective (billions of dollars)</b>
1. Improvement of productivity in agriculture and livestock (seeds, fertilizers, technical routes, fight against parasites and diseases, soil and water management, advice and extension, etc.)	5,500
2. Rural transport infrastructure (roads, bridges, pipelines, etc.)	5,900
3. Infrastructure for processing and marketing services in rural areas (storage, milling, rural markets, market information, etc.)	700
4. Direct food and nutritional support to vulnerable groups (cash and in-kind transfer, school meals, etc.)	3,300
<b>Total</b>	<b>15,400</b>

Source, Omamo & Mills, 2022.

According to other estimates, the total value of investments needed each year for agriculture and food systems ranges between \$15 billion and \$77 billion for the public sector alone. For the private sector, the total annual investment volume needed to build sustainable agri-food systems could reach up to \$180 billion. Its vital role is a common point between all methods of estimating financing needs.

How can we transform this funding to promote transitions towards more just and sustainable food systems? This is the question that mobilizes a research team led by the University of Coventry (Center for Agroecology, Water and Resilience), and University of Vermont UVM Institute for Agroecology) and *AgroecologyNow!* To effectively expand financial facilities and strengthen agricultural financing systems, the approach includes “catalytic investments”, i.e. flexible and risk-tolerant financing, digital solutions and alternative lending models .

The determining factors in the success of a financing system are not specific to Africa: proximity to credit applicants, quality of listening, professionalism of agents, availability of suitable additional services (advice, training, risk management ). But above all, due to the risks inherent in agricultural, pastoral or fishing activity, the absence of guarantees constitutes the most essential factor in the expansion of rural credit.

Changes are underway. The institutional landscape of agricultural financing is being restructured. Alongside States which hardly respect their commitments and traditional external aid which is not very innovative, new players have appeared: private foundations, venture capital funds, dedicated funds from development banks, incubation funds, leasing, lines refinancing, various facilities, etc., with the involvement of new private players, particularly Asian countries. Without forgetting the funds from the diasporas.

Currently constituting only one player among others in agricultural financing, will agricultural banks be called upon to return to occupy an important place in the future? In fact, since the 2010s, commercial banks have opened up, but with caution, to peasant agriculture. Some are forming alliances with microfinance institutions which have decentralized networks capable of being in proximity with farmers. Given the significant risks inherent in agricultural activity, going beyond this will require improving financing instruments and guarantee mechanisms.

## *Promote approaches territorialized*

The 2014 *Malabo Declaration* set out among its objectives the halving of post-harvest losses. Several possible solutions are open. Improved packaging, more careful harvest timing and cold storage reduce fruit and vegetable losses. The provision of processing units close to producers, allowing them to secure and add value to perishable foods. This is the case for example for cassava, which has become a staple food thanks to its plasticity, hardiness and good yields, but which must be processed two days at the latest after harvest due to its composition (70% of water). Another example, milling rice close to harvest can reduce recorded losses by half.

### ***Territorialized food systems***

*Territorialized food systems (TSF) correspond to a coherent set of activities that bring food from farm to fork in a space of regional dimension. They include production, processing, distribution, consumption and waste treatment organizations. They play on the complementarity of rural and urban territories.*

*A good organization of an SAT aims to:*

- *Invent/valorize production and consumption models that are more respectful of the environment and health,*
- *Reduce waste throughout the agri-food value chain,*
- *Promote local products in local sectors in order to*
- *Allow better sharing of the value created in the territory between the different SAT stakeholders.*

*Food and nutrition issues are localized on a territorial scale, taking into account sustainable development issues . Internal dynamics encourage the establishment of new farmers and innovative networks of small and medium-sized agri-food businesses.*

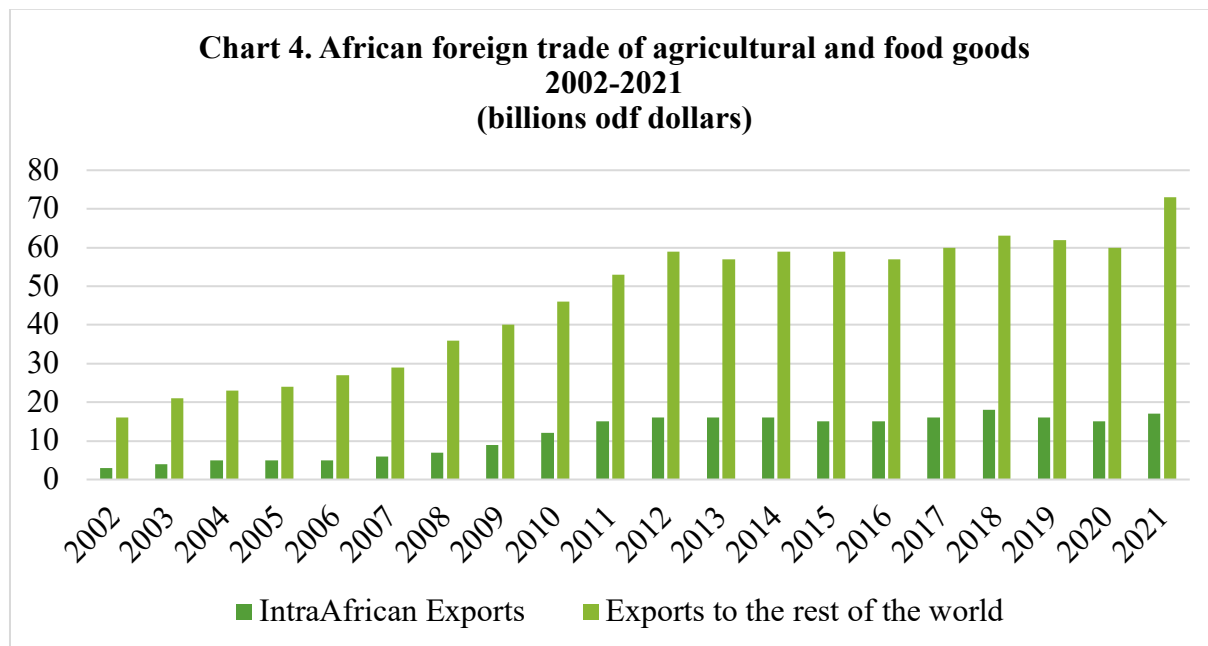
Many of the recommended approaches are local in scope, but those which highlight the territorial ecosystem make it possible to better identify the preferred methods of organizing agricultural value chains, to organize cold chains, to find cost savings. scale, to organize markets, to stick as best as possible to consumer preferences, to highlight the merits of the joint management of natural resources (water, land, pastures, biomass, etc.), to exchange on technologies of transformation, to find the means to fight against pests or against invasive species, etc.

Territorialized food systems already make it possible to design and promote production and consumption models that are more respectful of the environment and health. They also make possible a better sharing of the value created in the territory and in local sectors up to the cities. Conquering the regional market, on the scale of existing regional communities, will also constitute a realistic challenge, provided that the obstacles (storage, transport logistics, barriers and “ abnormal” practices) are removed. The markets for food products, livestock and fishing will then be driven more by potentially strong domestic and regional demand.

## *Bet on the region*

Africa trades little with Africa. This observation is obvious with regard to agricultural and food goods for which intracontinental trade has almost never exceeded 25% of total trade.

However, the region offers political leaders spaces to support the organization of agri-food value chains through economies of scale and specialization, as well as multi-sectoral synergies (creation of shared infrastructure, in particular).



Source ITC Trademap, 2023

Strong and growing, local and regional demand for quality food products offers a unique opportunity to drive the sustainable transformation of the agri-food sector in Africa. It enables countries to work to improve the efficiency and sustainability standards of production and supply chains, and to strengthen their resilience to global shocks through integration.

These considerations inspire regional policies. Thus, within the West African Economic and Monetary Union (UEMOA), the States adopted a common agricultural policy of the Union (PAU) in 2001. It constitutes a lever for harmonizing the efforts of the 8 member countries. The PAU's objectives are to ensure food security, cover the financing needs of agriculture, promote the diversification of production by reducing trade barriers and expanding the range of agricultural products and approved inputs ( Montaigne Institute, 2023).

If the obstacles are removed, we can indeed think that the market for food products will be driven more by potentially stronger regional demand than by exports outside Africa. Cross-border markets are already vital to virtually all African countries. However, intra-African trade in agricultural and food products is low: around 17% of foreign trade in African countries takes place intraregionally.

strategies , such as the African Union's Common African Agro-Parks Program ( CAAP), one of the concrete initiatives taken for the implementation of the Comprehensive Program for the development of African agriculture, in the commitment made in Malabo to triple intra-African trade in the agricultural and services sectors.

In the future, the potential for growth in regional trade is a priori high. For the Economic Commission for Africa (ECA), leveraging the Continental Free Trade Area (AfCFTA) which came into force in January 2020 to improve the functioning of markets and intra-regional trade would be the key ingredient for agricultural transformation of Africa, by improving commercial efficiency. She estimates that the Zone will boost intra-African trade by more than 50% by removing import duties, and double this trade if non-tariff barriers are also removed. However, there are challenges and potential obstacles to overcome to realize these benefits. One of them is that area benefits may not be distributed evenly. To date, eight countries (Cameroon, Egypt, Ghana, Kenya, Mauritius, Rwanda, Tanzania and Tunisia) are participating in the “Guided Trade” Initiative (GTI), which aims to enable meaningful trade in some 96 commodities. the agreement in order to test operational, institutional, legal and commercial policies.

An intermediate solution consists of favoring the six continental regions recognized by the African Union, for at least one generation, while intra-community trade progresses. In this more limited, but more coherent, framework, the establishment of regional value chains will meet two objectives: taking advantage of complementarities between countries and economic stakeholders in the region and exploiting the growing demand for finished products. But for this it will be necessary to tackle other obstacles. It would indeed be illusory to consider that the current obstacles to intra-African trade are essentially linked to tariff barriers. If that were the case, it would have reached high numbers. Internal non-tariff obstacles remain numerous and well-rooted: unforeseen quotas, refusal of preferential conditions, poor delivery and storage conditions, etc. Without forgetting what economists modestly call “abnormal practices”: the multiplicity of official and unofficial checkpoints, ransoms at borders, “harassment”, abusive controls, discrimination against truck drivers, etc. Various measures will be necessary to reduce operational and bureaucratic delays, remove roadblocks and alleviate the distortions introduced by archaic regulations.

Generally speaking, due to the growth of its demographics, accompanied by rapid urbanization, regional demand in Africa is driving growth. The increase in purchasing power of the African middle class should potentially boost regional markets and therefore enable import substitution to be achieved.

### *Meeting logistical challenges*

There are approximately 700,000 km of rural roads in sub-Saharan Africa in a total network of more than one million km. This network should be expanded tenfold if the continent's total agricultural potential is to be realized.

Reducing the cost of rural transport directly increases farmer income and helps reduce the price of food in urban areas. This also helps facilitate the timely distribution of agricultural inputs, limits post-harvest losses (PPR) and builds resilience to shocks in supply chains. It is estimated that in Madagascar, new rural roads increase the income of the most isolated households by around 50%.

The general weakness of rural infrastructure management capacities is a serious obstacle to resource mobilization and maintenance. Hence an Africa that is under-equipped, compared to its potential, but overwhelmed by the burden of its insufficient infrastructure.

The need for better rural transport infrastructure in sub-Saharan Africa is pressing and evident. Rural transport strategies all follow the same objectives: coping with the “first kilometer” constraint in the transport of agricultural products from the farm; increase resistance to climatic hazards, particularly through improving roads in rural areas; correct market failures and remedy monopolistic practices of rural transport network operators; set up farmers' associations or agricultural cooperatives in order to reduce the price of transport; put in place effective systems for maintaining tracks and roads...

The potential gains in production and income, highly unlikely without improved roads, would be enough to justify the annual spending level of \$5.9 billion. But in almost all countries, rapid expansion of rural road networks will not be feasible without the establishment of adequate institutional and financial arrangements for planning construction and maintenance.

On a broader regional scale, some believe that “agricultural growth corridors” will provide part of the solution to the isolation of certain territories and will stimulate regional integration. An agri-food version of the South African concept of *Spatial Development Initiative* (SDI), where road, maritime and rail infrastructure are mobilized as means of developing regions located around a main axis, they already play an important role in the development plan. The integration of southern Africa, which has around 12 connecting the landlocked countries of the area to the ports of neighboring coastal countries. We think, for example, of the Trans-Kalahari

corridor between Walvis Bay (Namibia) and Pretoria, with an extension towards Maputo, thus connecting the Atlantic coast and that of the Indian Ocean. Also important are the Beira Corridor (BAGC) in Mozambique and the Southern Agricultural Growth Corridor of Tanzania (SAGCOT). The importance of smallholder farmers and the benefits they can derive from their participation in industrial production are constantly emphasized. For SAGCOT, suppliers of agricultural inputs, machinery and agricultural support services (extension agents, financial services), commercial farmers, processors and suppliers of irrigation equipment are matched. Proponents believe that without infrastructure in place, it will be difficult to attract investment in agriculture and that without commercial agriculture to attract it, states will be unwilling to invest in infrastructure. The corridors are meant to tackle both problems at once. We can also cite the corridors which are traced from the coast towards the interior: Beira-Nacala multimodal corridor, Abidjan-Lagos coastal corridor, Cairo, Gaborone-Cape Town corridor, Highway Lagos-Dakar, etc., and many others projects. However, so far, few of these cross-border projects have resulted in sufficiently significant progress. This is due, in part, to the fact that the establishment of links between infrastructure planning and neighboring activities has not everywhere met with adequate policies that are part of the long term of development.

### *Protect selectively*

Africa remains an importer of agricultural food products worth an estimated \$110 billion for major food products in 2022, the majority of which comes from the importation of basic and processed food products (mainly wheat, edible oil, corn and rice), which can nevertheless be produced by Africa. If current trends continue, this import bill could increase by 50-60% and potentially double over the next ten years.

What to do ? Border protection is structuring if it is well designed. A certain unanimity has been emerging for a decade around the idea that moving away from impoverishing specialization, diversifying one's production, climbing regional value chains, expanding local exchanges and promoting the mobility of human and financial resources towards nearby regions where they are most useful would be actions to promote the “ emergence” of the African continent.

As noted by the FARM Foundation (2022), analyzes on the nominal rate of protection And public support expenditure shows that the low competitiveness of agricultural sectors in African countries, combined with weak protection against imports of low-priced and heavily subsidized products in the States of origin, reduces the effectiveness of public expenditure at the agriculture, which are also insufficient.

There is no shortage of arguments for an increase in customs duties on agricultural products in Africa: reduction of competition from low-cost imports to strengthen local value chains, reduction in the trade deficit, less food dependence on markets. worldwide. And elimination of “import rents” enjoyed by many large traders. A good example to illustrate these orientations is given by Morocco with its policy of import substitution through non-tariff barriers; the government further plays a regulatory role that controls the prices of essential food products and provides input subsidies for producers.

In this perspective, new avenues open up for public policies with the recognition of the virtues of selective and reasoned protection at the borders of the national, or even regional, space. However, do States still have an interest in playing with the level of protection? The question arises in well-known terms.

An increase in duties, by raising the price of imported food, penalizes urban consuming populations, particularly the poor, who are very sensitive to an increase in the cost of food. A reduction, by favoring imports, penalizes small farmers subject to increased competition.

We know the answer to this “Timmer's food price dilemma” (1986): the question of customs duties must be addressed within the broader framework of state agricultural policies.

On the producers' side, a reduction in import taxes is only justified if it is accompanied by public investments intended to improve agricultural productivity (advice, credits, infrastructure) and therefore to ultimately improve the income of small farmers. .

On the consumer side , an increase in tariff protection must be part of a strategy combining various measures: an improvement in the market power of farmers within value chains , incentives to “consume locally”, tax provisions to reduce the food bill of the poorest households. Compensatory measures can take various forms: social safety nets, reduction or even elimination of the value added tax (VAT) on the foods concerned, vouchers for withdrawals of food products from public stocks or directly from farmers, subsidized meals in canteens, distribution of milk or fruit and vegetables in schools.

An optimal policy may consist of a moderate increase in customs tariffs and strong support for investment, ultimately promoting an improvement in the productivity of value chains which will result in both an increase in farmers' income and a reduction food prices The underlying idea is that development is a dynamic process and that it is necessary to go beyond the notion of short-term gain or loss by taking into account the effect of policies over time, as recommended in especially Kako Nubukpo (2022). The most proactive option is that of “regional preference”. It joins that expressed by the African Union which advocates, more or less explicitly, a form of selective protectionism, limited to the relevant scale of intracontinental territories, in view of the advantages it presents compared to openness without limits to the global market.

Furthermore, trade policy cannot be analyzed independently of the policies which lead to the fixing of currency exchange rates. An overvalued currency – as the CFA franc is, according to several experts – actually favors imports and penalizes exports.

### *Finally establish overall consistency*

The transformation of agricultural and food systems requires systemic approaches with cross-sector collaboration, and above all combining agriculture, nutrition/human health and climate/biodiversity.

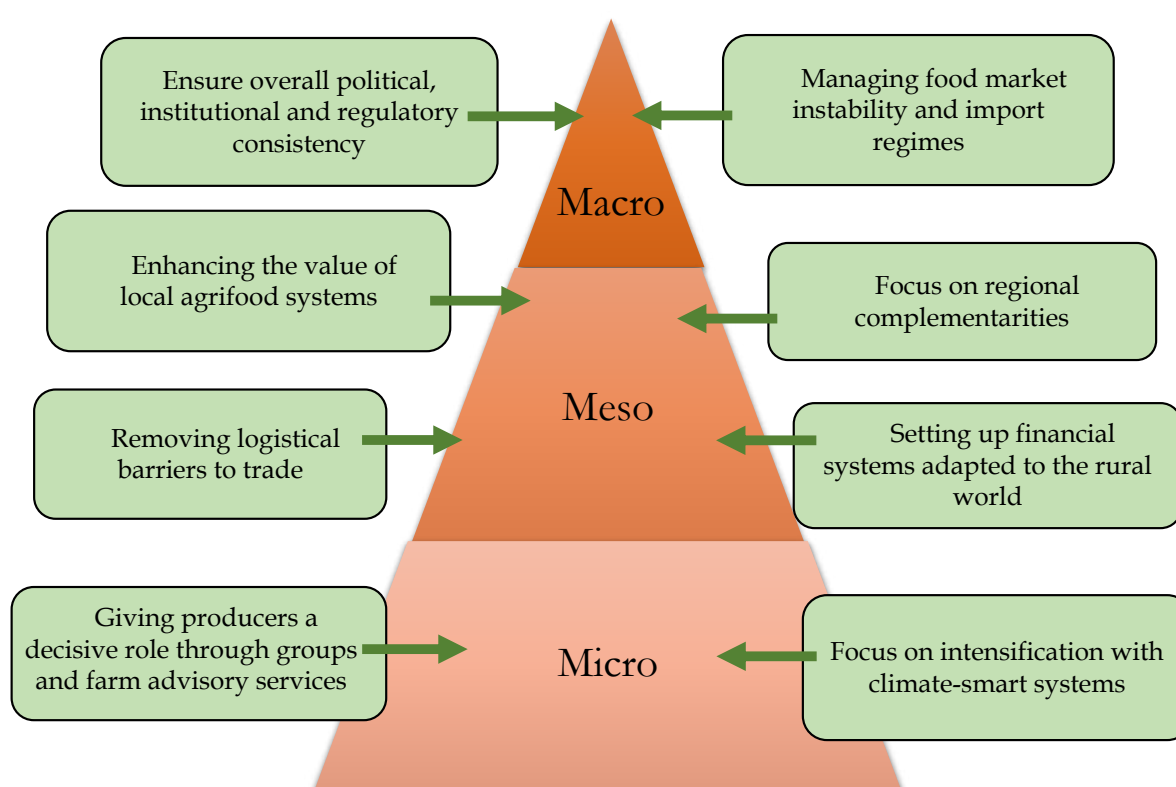
Experience shows that coherence between short-term responses to crises and longer-term transformational changes must be the focus of efforts. This is not the least of the difficulties. For a long time, the right hand (supporting grain production) did not know what the left hand was doing (issuing import licenses). The contradictory nature of a proactive policy to develop local production and at the same time favorable to importers perfectly illustrates the dilemma in which political powers find themselves, alternating between protecting the interests of rural producers and that of urban consumers. The system for granting rice import licenses is almost everywhere sensitive to pressure for tax exemptions and does not encourage the local sector.

The contrast is striking between, on the one hand, the needs of agricultural transformation which requires long-term investments, a stable and predictable economic, commercial and regulatory environment and, on the other hand, the way in which the agricultural sector is governed on the African continent with successions of interventions often marked by the seal of the short term. The FARM Foundation's Global Observatory of Public Support for Agriculture shows that countries that depend most on agriculture spend the least to support their farmers and that agriculture in Africa is considerably less supported than elsewhere. . Even more serious are the supports which focus on measures which contribute only very indirectly to agricultural development and especially subsidies for access to inputs which are most often imported.

By nature, agricultural and food policies are multidimensional. It covers agronomic aspects, commercial components and structural questions. Policy coherence therefore requires multi-level thinking, efforts to reform all parts of integrated food systems, and evaluations of agricultural support policies. If designed in a systemic way, they can provide part of the answer to the two crucial questions of rural employment and food-nutrition, but only part.

Accepting complexity requires adopting a systemic understanding of challenges and solutions. In the future, the global, institutional and regulatory framework (*macro*) will remain as determining for the success of a strategy as the parameters controlled at the level of producers (*micro*), projects and value chains (*meso*). Most of the economic control variables (public investments, administered prices, subsidies, transfers, competition rules, exchange rate policy, taxation, debt level, etc.) will have decisive impacts on the direction of agri-food systems.

**Figure 3. The pyramid of food sovereignty coherence**



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The “Zero Hunger” target of the Sustainable Development Goals (SDGs) is undoubtedly a gigantic challenge for Africa to meet by 2030. It is certain that the current food crisis will not be resolved by taking the same path as that of the past. It will have to give rise to the demand for profoundly transformed values and practices, for radically different modes of production, exchanges and management. More generally, it will have to seize the opportunity to deal in an integrated and contextualized manner with economic issues, social issues and ecological issues.

The parameters of structural transformation are within the reach of those in power. As long as they allow the multitude of emerging innovations to unfold and facilitate their appropriation by national stakeholders and their scaling up to guarantee their irreversibility. Establishing knowledge sharing platforms should enable African countries to leverage their respective successes and challenges to accelerate transformation across the continent.



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