



# AGRICULTURAL LAND AVAILABLE IN SUB-SAHARAN AFRICA?

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Forecasts on the potential of agriculture in sub-Saharan Africa on the basis of which large scale land transactions are being deployed, are based on a rhetoric of the "empty continent", adapted to establish agricultural policies as well as to justify all manner of greed. This thesis of the existence of "dormant resources" which would amount to approximately a billion hectares in useful agricultural surfaces area is incorrect. This article introduces the concept of actual availability of agricultural land and takes into account all the real estate constraints in order to assess the surface area likely to be actually devoted to agriculture.

The most optimistic production forecast theories rely on the rhetoric of an Africa rich in "dormant land resources", "vacant and without masters". There would be an abundance of available land, unassigned and ready to be used. 50 million hectares of arable land has already changed hands, between 2000 and 2018, 90% of which to the benefit of foreign interests (Oakland Institute, 2019). It is thought to be concentrated in certain regions particularly favoured in terms of land fertility, access to water and transport infrastructure.

This rhetoric is also well adapted to respond to the question of the Africa's ability to occupy an agricultural labour force which is very likely to increase by approximately 330 million people over the 40 years between 2010 and 2050 and its ability to cover its own food needs by farming its available land.

The reality is more complex. Land availability is a relative concept in a continent where various modes of ownership and use overlap, but which is also marked by strong agronomic and ecological constraints.

A robust, detailed knowledge of agricultural availability is essential to estimate production potential as well as installation possibilities for newcomers. On the basis of new estimates and a more demanding analysis, this case study draws from a previous *Willagri* article (20 November 2017), entitled "The Myth of the abundance of arable land in Africa", and attempts to answer three questions: Can we assess the true availability of agricultural land? Can we identify the constraints that are opposed to its extension? And glimpse the dynamics in play when it comes to commercialising African land?

## The available, the exploited and the untapped

In order to assess the surfaces likely to be devoted to agriculture in sub-Saharan Africa, let's introduce the notion of *land availability* by distinguishing 5 balances one after another:

- The *total*, which corresponds to the total available land surface;
- The *useful*, after removing inhabited areas and those unsuitable for cultivation or;
- The *potential*, after removing forests and protected areas;
- The *operated* which is currently being farmed;
- Finally the *exploitable balance* which corresponds to the agricultural surface area actually available and not cultivated, biologically useful and economically viable without excessive costs for society and the environment alike.

Let us measure this using data from the recent Bauhaus Luftfahrt carried out in Munich (Riegel, Roth and Batteiger, 2019) established on the basis of high resolution geospatial data to estimate

the areas devolved to different types of use of the soil, supplemented by that of the United Nations for agriculture and power supplies (FAOSTAT).

The approach is called "residual", in that we gradually identify the areas which are not available for agriculture, thus varying the balance if changes occur in any of the subject areas.

With a *total* of 2 456 million hectares, the sub-Saharan sub-continent is vast.

The areas considered to be *useful*, i.e. virtually likely to be devoted to an economic activity of one kind or another, cover nearly 1 537 million ha of this zone, after deduction of continental waters, land considered non-cultivable because it is affected by desertification and areas of population settlement, cities, transportation routes, etc. (ELD-UNEP, 2015; Riegel et al., *Op. cit.*).

To obtain the *potential*, we must remove the forests (677 Mha) and protected areas (155 Mha<sup>1</sup>), recognized for their ecological value and whose exploitation for agricultural purposes seriously affect environmental balance.

Within the potential available balance, the land *already exploited*, with annual and long-term cultivation account for approximately 240 million hectares (OECD/FAO, 2016; FAOSTAT, 2019).

Finally, prairies (including the trails, pastures and cropland, comprising trees, pasture and fodder) devoted to permanent pasture and extensive pastoralism, cover approximately 29% of the useful available surface areas (not uncultivated for livestock), or 445 million ha (FAOSTAT, 2017).

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

Total surface of sub-Saharan Africa	2,456
<i>Continental Waters</i>	- 65
<i>Areas of Settlement</i>	- 3
<i>Uncultivated land</i>	- 856
Balance 1: Available useful	1 532
<i>Forests</i>	- 677
<i>Protected areas</i>	- 155
Balance 2: Potential available	790*
<i>Areas already exploited</i>	- 240
<i>Prairies and permanent pastures</i>	- 445
Balance 3: Available unexploited	105

\*A correction is made in order to take account of the overlap between protected areas and forests, estimated at 12% (Riegel and Al, 2019). The sources of data are indicated at the end of the article.

**The net balance of exploitable land is approximately 100 million hectares.** The accuracy of the data is relative, but one conclusion appears evident: "There is still substantially less available viable land than is often stated once taken into account all the constraints and trade-offs between various functions" (Lambin et al. , 2014, p. 900). We must include functions other than those which are strictly agronomic or economic and often obscured in arguments which boast the opportunities associated with the agricultural potential of the sub-Saharan sub-continent.

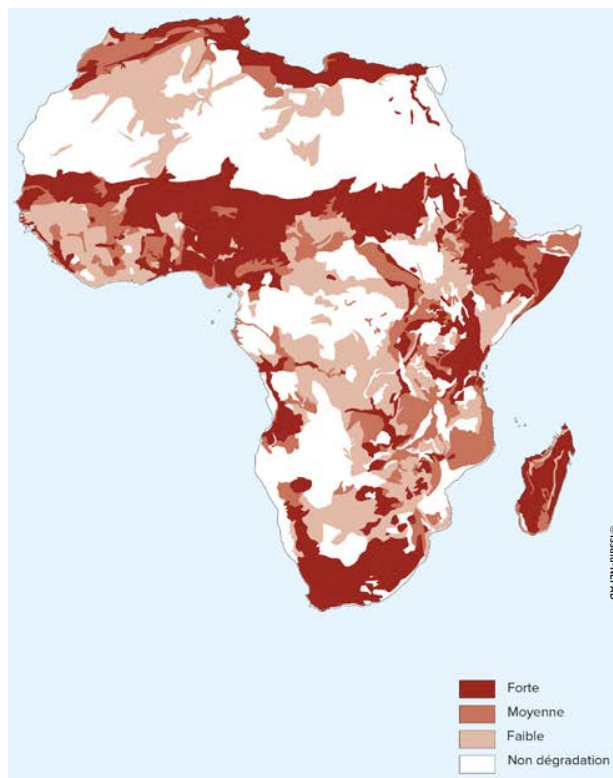


## The available and the degraded

In the dominant argument on “Empty Africa”, ecological constraints are always underestimated, despite the fact that they significantly reduce the scope of availability. Here we find the distinction between *availabilities* and *sustainabilities*.

The combined effects of agricultural activities and climate change have accelerated the degradation of agricultural land grown both for arable land and pastures (Právělie, 2016)<sup>2</sup>. Soil degradation, as observed by remote sensing and satellite imagery, is greater in Africa than in the rest of the world (ELD-UNEP, 2015; Riegel et al., 2019). A significant proportion of available land is subject to serious ecological vulnerabilities: losses by erosion, salinization of soils, leaching of nutrients, accelerated mineralization, export of plant biomass, risk of invasion by predators, recurring plant diseases (Chaoran and Restuccia, 2018). Organic matter rates are often very low. In arid and semi-arid regions, the loss of the organic soil matter (MOS) and the conversion of the rare wetlands into arable land accelerate the acidification of the environment and desertification; and the rising temperatures leverages the speed of carbon mineralization in the soil (Guedegbe et al., 2018). For their part, watered regions, which account for approximately 58% of the area cultivated in Africa, does not fare much better, even if the issue of soil degradation is not quite the same: the significant rainfall in these areas cause floods, especially when the soil has a low plant cover. The resulting water erosion mainly concerns central Africa where the index of annual Tillage erosivity is very high (Panagos et al., 2017).

### Magnitude of soil degradation



NEPAD Source, 2013

Agricultural practices are not always optimum from the agronomic and ecological point of view (Le Moël et al, 2018). The major causes of land degradation include inadequate agricultural and forestry practices (too frequent ploughing, poor management of irrigation or phytosanitary treatments, overgrazing, excessive levies of forest products, uncontrolled bush fires). The absence or limited use of fertilizers causes a severe depletion of nutrients in the soil. The balance of nutrients is negative, with more than 4 times more nutrients exported by the product of the crops than those made in the form of manure and fertilizer (Guedegbe et al. , 2018; FAO, 2019).

In total, more than half of the area available for agriculture in the African continent would be affected by these processes of land degradation, thereby very seriously penalizing yields (OECD-SWAC, 2013; eld-UNEP, 2015; IFAD, 2019). This means that ***the actual availabilities still unexploited, and likely to be so in conditions which are sustainable for the environment*** (in preserving the forests, prairies, and habitats with ecological value) ***and with higher returns to an acceptable minimum***, for cultures of at least one of the following products: wheat, corn, cassava, cotton, peanuts, cocoa, coffee, tea, palm oil, soy beans, rapeseed, fruits, vegetables, sugar, cut flowers and agrofuels, ***would be approximately of the order 50 million ha***. This corresponds to the total large-scale land acquisitions by foreign investors between 2000 and 2018.

## The available and uses

The available *exploitable* is therefore not likely to be exploited. The high value implementation constraints may be applicable for reasons other than agronomic ones. They are noticeable on a map drawn from a geospatial observation, as fine as it is. Here we find another distinction between *sustainabilities* and *suitabilities*. The lands have a social function. To understand it, we must perceive the “inner” realities of African agrarian practices and and the history of the land environment. However, the previous data incorporate without distinction land in summer fallow, i.e. Temporarily "rested" from production, as well as land used by the populations for their survival (collection, harvesting of wood for heating, hunting), community forests or even of areas reserved for ancestral rites which must clearly be excluded, failing which the general ecosystem of the territories concerned could be put at risk..

The above factors further reduce the areas newly usable for agricultural activities. And that doesn't event include social and legal constraints<sup>3</sup>. It is estimated that in sub-Saharan Africa, less than 5 per cent of the land is registered in land registers or officially recognized by certificates or real estate titles. The rest may seem "free", but without being so. Non-use for economic purposes or observed under-use does not mean full availability. "Vacant" is a quirk of legal language because this means in reality "populated but by occupants without titles". Vacant is a definition for external use: "When there is talk of *idle land*, literally the land lazy or idle, nothing is done other than to stigmatize a mode of occupation of the land to better justify appropriation" (Chouquer, 2012, p. 8).

Outside the Sahara, in the heart of the Congolese basin and in protected areas of Kenya, Tanzania and Southern Africa, there are in reality virtually no rights-free areas in Africa, even in areas apparently available in large arid zones (Boone, 2013). As elsewhere, in Asia in particular, they are virtually always subject to rights and specific uses, originally established around the lineage, via successive land clearances by descendants. They now include useful or sterile land, and cultivated or fallow land. They result in very complex situations on the ground (Diop, 2016). Complex does not necessarily mean without order. On the contrary, a precise distribution of the functions of the land is established in which farmers still often refer to ensure their security in land tenure and food.

Legacy uses, entrenched in customary and unknown ancestral rights in agricultural statistics as on maps, but still widely used in African country areas, are essential to the reproduction of the family economy, in arid areas and in the wetlands. As soil availability is linked to the type of agreement between practices and social standards, it is therefore a concept which is variable both in time and space, but it also depends on the status of those concerned (men, women, old, young, natives or outsiders) and institutions (state, public communities, private sector, communities,...).

**Table 2. Summary of constraints for the actual release of agricultural land**

Social	Political, administrative	Economic	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 grassland or trails</li> </ul>	<ul style="list-style-type: none"> <li>- Political land access limits</li> <li>- Existence of unresolved land disputes</li> <li>- Classified forests</li> <li>- Protected areas</li> <li>- Permanence of an insecurity</li> </ul>	<ul style="list-style-type: none"> <li>- High cost of Implementation related to the protection and regeneration of degraded soils.</li> <li>- High cost of access to water</li> <li>- High costs related to the spatial fragmentation of plots</li> </ul>	<ul style="list-style-type: none"> <li>- Risk of erosion, floods or drought</li> <li>- Phytopathological Constraints</li> <li>- Land unsuitable for cultivation or with insufficient yields</li> <li>- Danger of compulsory purchase orders in peri-urban areas</li> </ul>

The demographic pressure also plays a role. A large part of the rural population now live in more densely populated areas (Yeboah and al, 2018). "Land is becoming less and less available and plots are more and more small and fragmented. In addition, parents live longer and continue to cultivate their land for longer. Young people who want to cultivate can work their parents' land, thus delaying their transition to independence and their enhanced decision-making authority, or, if their finance and the local rental market allow, they can rent the land. If they rent, the problems of quality of the land and security of tenure are becoming a concern" (IFAD, 2019, p.23).

Faced with this set of constraints, two options are open to conquer and expand the untapped potential. 1/ move back the physical boundaries (extensification); 2/ alleviate the customary normative framework (commercialisation).

### The extensification under strong limits

Will we be able to push back the physical limits to the expansion of agriculture? Can we conquer new lands from the 50/100 million ha available and not operated under the pressure of a highly growing demand for land?

According to the forecasts of the FAO who founded the *Comprehensive Africa Agriculture Development Program*, a reference text adopted by the African Union (NEPAD, 2002), a quarter of the projected growth in agricultural production between 1995 and 2030 should come from the extension of arable land and three-quarters of the intensification in the form of increases in yields (62%), and more intensive farming(13%). This forecast has not fundamentally changed since. The FAO estimates today that agricultural production will triple by 2050 in Africa to meet the demand for food on the mainland and still considers that it will come twice as much from increased yields and crop intensity than from extensification, if such extensification complies with environmental constraints. One of the FAO forecasts regarding cultivated land focuses on 315 million ha in 2050 for sub-Saharan Africa, including 307 in rainfed farming and 8 in irrigated cultivation (FAO, 2011).

Extensification is nonetheless implemented. As was the case between 1995 and 2016 since cultivated land in sub-Saharan Africa rose from 155 to 240 million ha (FAOSAT, 2017). The areas of cultivated land in the region of the Sahel in West Africa have doubled since 1975, the area of settlement increased by approximately 150% (Traoré et al.<sup>4</sup>, 2014). The new pioneering agricultural fronts are strongly developed at the expense of forest areas and areas of pastures, with detrimental effects, both for the communities concerned and for the supply of meat and milk for both the rural and urban populations.

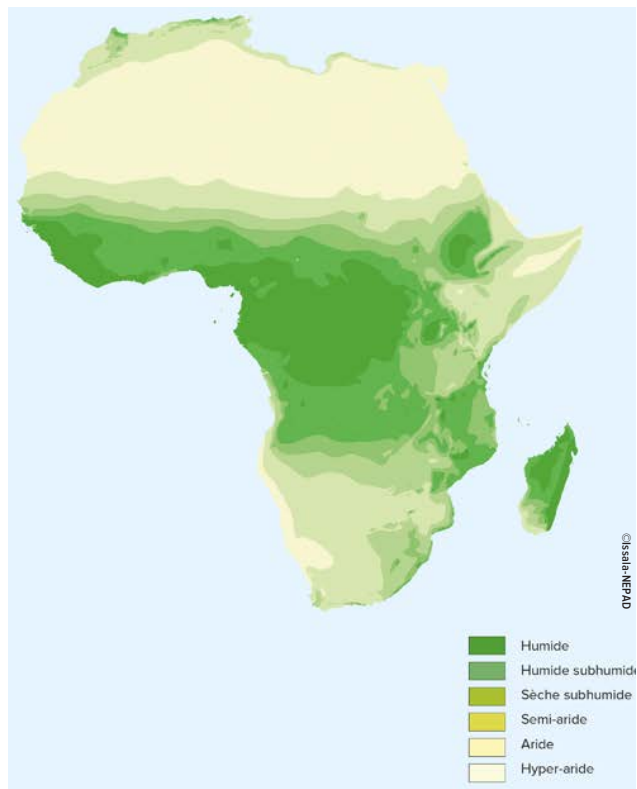


Deforestation is increasing and agriculture is the main cause. Data published by Global Forest Watch (University of Maryland, 2019) place RD Congo in second

place of the countries most affected by the disappearance of their forest ecosystems, with 480 000 ha lost in 2018, Brazil comes first, while Côte d'Ivoire, Ghana and Madagascar have seen their rate of loss increase considerably.

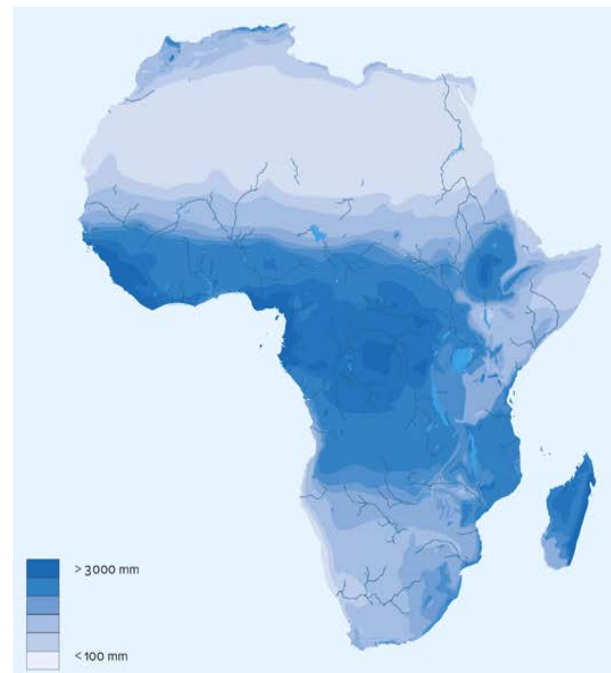


## Large agroecological zones



Source, NEPAD, 2013

## Annual rainfall (mm) and hydrographic network



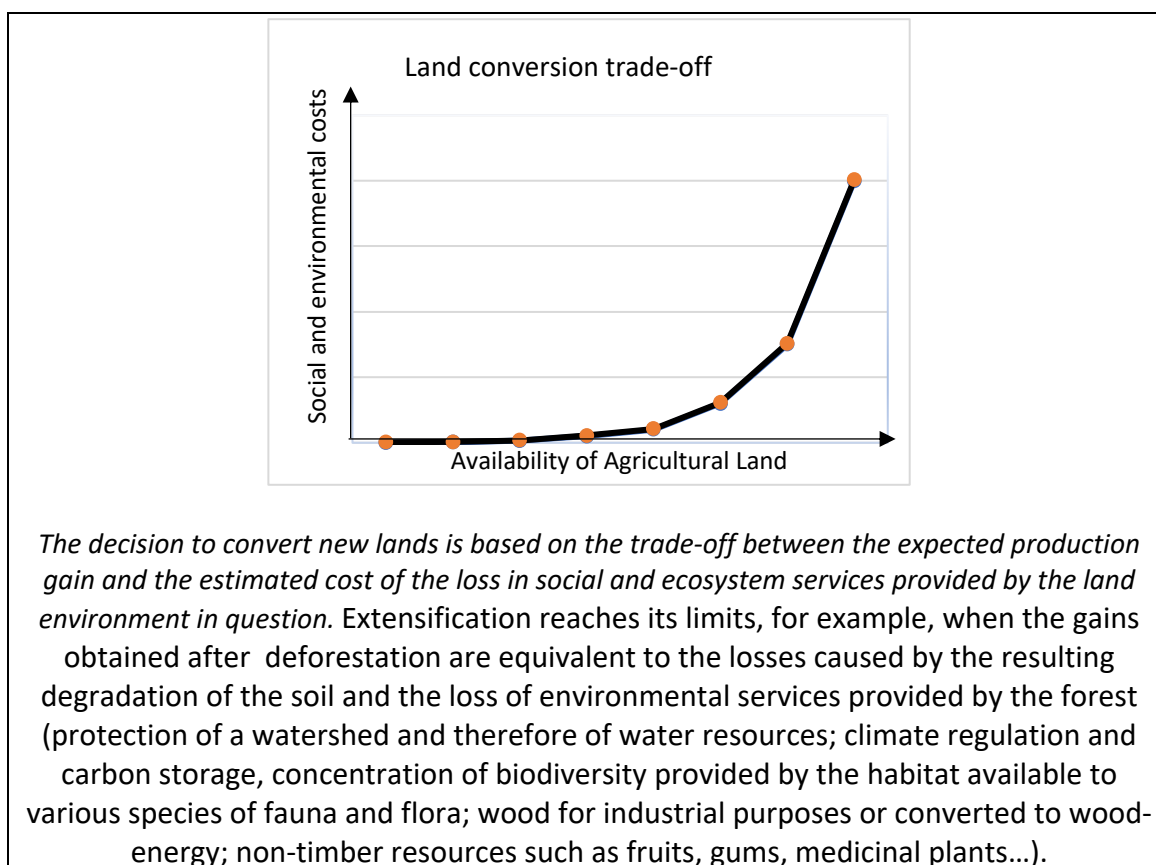
When it comes to protected areas, so numerous in Africa, some appear in certain situations (for example the Parks of Virunga, Kahuzi Biega and Salonga and the Garamba in RD Congo) as isolated areas, eaten away by forest clearance by farmers and practices used by breeders, and exploited by poaching, the illegal extraction of timber, the growing scope of mining... This heritage is in danger, as is the wildlife that lives there (Jacquemot, 2018b).

Extensification is sustainable by development and irrigation. In sub-Saharan Africa, currently only 6 per cent of the cultivated areas are irrigated (Nkonya et al. , 2016), compared with 40% in Asia. Renewable groundwater resources could contribute to increasing the proportion of irrigated land by more than 20 per cent of the cultivated land in the region (Altchenko and Villholth, 2015). But the excessive subtraction of groundwater for irrigation of crops would become an important environmental problem in many arid areas requiring a design and a careful planning of expansion projects.

Taking everything into account, extensification is never a cost-free, consequence-free option, and it rarely goes smoothly. Land tenure conflicts between pastoralists and sedentary farmers are more frequent.

The conversion of land to increase availability is therefore an option considered restricted, compared with the potential yield from intensification (conventional, transgenic or agro-ecological). As we have seen, there are many reasons. It can be summarized by saying that

extensification always comes with exponential costs. The graph below provides a simple illustration: the xxx depend on the ecological and social cost of land conversion, which increases the closer you get to the physical limits.



## The commodification of soil, as a systemic breakthrough

As was seen above, the constraints linked the expansion of African agricultural availabilities relating to the legal and social status of the earth are decisive. Is this a long-term situation?

In principle, the terms defining land rights change relatively slowly due to social rigidities in rural areas. But, in the current context, one cannot fail to see an acceleration in the process of inclusion of means of access to the land and its resources in the market economy, even when they seem to remain in lineage or customary practices (Collier, and Dercon, 2014; Headley and Fan, 2014). To the extent that affirming the inalienable nature of land, often associated with mystical links - land-ancestors-spirits-fertility, would refer today to a "backward-looking perception", seriously shaken by the facts (Ph. Colin, 2017). If one puts aside the more remote areas, isolated, far from roads and markets, the trend toward a commercialisation of the access to land would become evident (with Côte d'Ivoire as an illustration for Ph. Colin), with the increase in land pressure due to demographic change, urbanization and the expression of a rural land demand from local elites, rather than just foreign investors.

These changes are confirmed by other studies, focusing in particular on changes during the last decade in the distribution of the size of holdings (Jayne et al. , 2016). Demographic and health surveys (EDS) representative of six countries (Ghana, Kenya, Malawi, Rwanda, Tanzania and Zambia) show that urban households have between 5 and 35% of the total farm area and that this proportion is increasing in all countries. This suggests the existence of a new channel, hitherto unknown, by which the mid-size farms could modify the strength and location of agricultural growth and multipliers of employment between rural and urban areas (IFAD, 2019).

This "commodification" of rights of access to land is identifiable in various trends as the rise in the range of mid-size farms, in particular in the 10 to 100 hectares range; this phenomenon reflects an increased interest in the land from city-dwellers of the wealthier classes and is accompanied by a rising trend of the price of the land both in rural areas and in the areas close to the cities. This results in an irreversible erosion of the customary tenure under the effect of the individualization of rights and a parallel confiscation of the land annuities outside of the lineage, community or chieftainship sphere.

The process of extension of land by commercialisation does however meet with resistance.. Strong tensions exist, in particular in areas already affected by powerful pressure on resources as in Ethiopia, Madagascar or the Sudan. Peasant revolts are perhaps less frequent in Africa than elsewhere, but they do exist. In these possibly conflicting contexts, the emergence of a management of the land environments by their occupants constitutes a promising aspect in the development of new land policies (Jacquemot, 2018a).

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The assertion of a very broad availability of virgin lands without any human exploitation in Africa south of the Sahara precludes concrete situations of a land environment in upheaval. On the one hand, it is still marked by the characteristics of the population and by the relationship between companies and their environment, which are part of complex historic trajectories and, on the other, by the accelerated process of the land commercialisation, under strong agronomic constraints, both environmental and human. At best, the possibilities of expansion, without threatening the forests, protected habitats and grazing land, and before any intervention of large scale land development, with intensive use of irrigation, rise, according to our calculations to a fifth of the areas already cultivated.

Despite their obvious interest in the definition of appropriate policies to confront the issues of the expected growth in needs for land and food, there are numerous limitations when it comes to estimating Africa's agricultural heritage. We may hope for an improvement by cross-referencing more reliable data from observations in the field and those taken from processing satellite images. The topic is of importance because we can say without fear of being wrong that the question of land availability will remain critical in Africa over the coming decades. Until 2040, family agriculture will be still the lifestyle of approximately 60 per cent of the population; it will always provide the bulk of agricultural and food production. The challenge is also political, as it will seek to reduce the risk of tensions associated with the use of the soil (and also in the sub-

soil). That said, the question of land is not limited to rural development policy. Various other problems, all as crucial as that of productivity of labor and land, as well as access to credit and regional markets and the question of employment will continue to arise in the future.

## Data Source

*For global Areas:*

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*For land acquisitions:*

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