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AGRICULTURAL LAND: A BRAKE ON CHINESE FOOD INDEPENDENCE

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Over quite a short period of time, China has become a dominant player in the global economy. In thirty years, the country has moved from being a preponderantly peasant state to an economic power of the first order. Projections made by economists and various international institutions suggest that China ought to be the leading economy in the world by 2030 or 2050. According to the French research centre in international economics, the CEPII, China's economy represented 10% of global GNP in 2010, but could represent in the region of 21% in 2030 and 33% in 2050.

However, China's achievements must not be allowed to mask its fragilities, beginning with agriculture and the supply of food to its population. It is, admittedly, often described as 'the workshop of the world' and the 'number one creditor nation', but it stands out for its genuine vulnerability where agriculture is concerned—a point too often underestimated or even left out of account altogether.¹ Several observers have pointed out that China's accelerated industrialization involved a process of securing supplies of raw materials for industrial or energy purposes, but the question of agricultural produce was not taken greatly into account. Yet this pattern of development represents an important constraint that should be highlighted, insofar as it raises the question of food security. Food security is assessed from the standpoint of self-sufficiency in grains and, more particularly, cereals. In 1996, the Chinese government set the threshold it must not fall below at 95% self-sufficiency in grains. Yet Chinese food production is caught in a vice between a constantly rising and diversifying demand and declining areas of cultivated land.

The aim of this article is to show up this vulnerability on the part of China in the agricultural field, by focusing on the question of land availability.

The Availability of Agricultural Land in China

China is highly varied in its geography. Climate and terrain mean that some regions are rather inhospitable, either on account of mountain ranges or desert areas, which stand in the way of agricultural activity in a country nonetheless famed for the size of its peasant population. Despite its large surface area, agricultural land is relatively limited. In fact, out of a surface area of 960 million hectares, mountains occupy one third of the surface, forests 18% and high plateaus one quarter. The official figure for cultivated land in 2012 stood at 13% of surface area or almost 121 million hectares. China has always been the country of 'little land, many people' (人多地少). At the beginning of the twenty-first century, it possesses 0.08 hectare of agricultural land per inhabitant—well below the global mean, which stands at around 0.24 hectares per inhabitant. Given its population and the economic situation it has attained over the last thirty years and more, this restrictive physical geography raises formidable problems for the authorities if they are to guarantee supplies of agricultural and food produce.

The Shortage of Land

In 1996, the Chinese authorities set 120 million hectares as the minimum level of cultivated land required to maintain 95% self-sufficiency in grains.² The precise area of land actually under cultivation in China is very difficult to determine, as the history of the Chinese official statistics attests. From 1978 to 1995 the official data indicated that the area of cultivated land was approaching 100 million hectares, with a fall to 95 million in the mid-

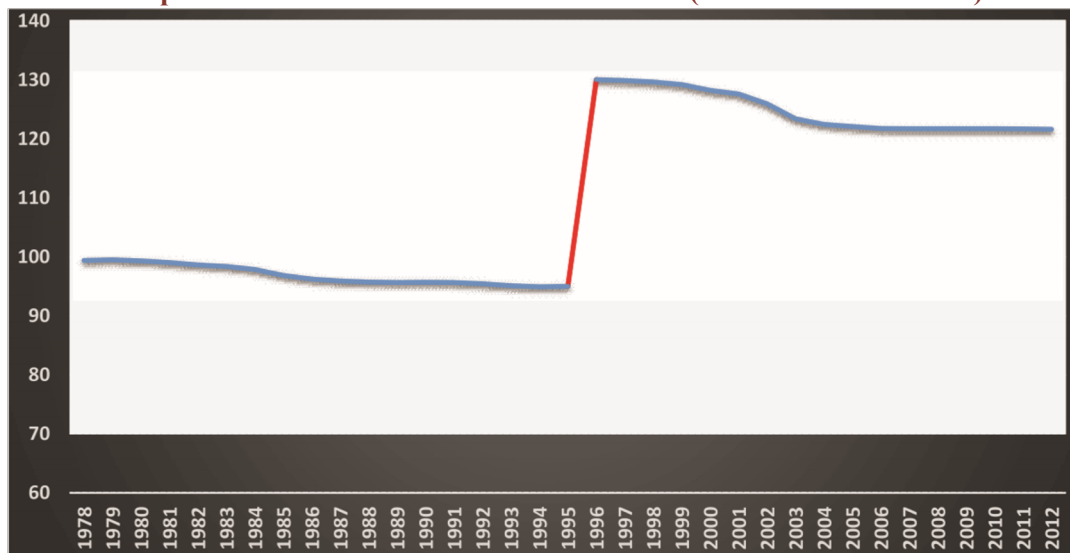
¹ BERGÈRE Marie-Claire, *Chine, le nouveau capitalisme d'État*. Paris: Fayard, 2013; MEYER Claude, *La Chine, banquier du monde*. Paris: Fayard, 2014.

² In China, land is divided into five main categories: cultivated land (including irrigated land and land for vegetable growing); plantations and orchards (fruit, tea, silk, rubber); forests; pasture or grassland; and 'other'.

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1990s. However, the data of the National Bureau of Statistics were disputed and a study of agricultural land from satellite imaging carried out by the Chinese Ministry of Land and Resources in 1996 concluded that the figure had been greatly underestimated. The statistics were rectified and in 1996, the official figure for cultivated land in China was given as 130 million hectares (graph 1). The data published since 1996 come from the detailed surveys of the land ministry.

Graph 1 — Area of Cultivated Land in China (in millions of hectares)



Source: Groupe Économie du Bétail-Institut de l'élevage (Cattle Economics Group, French Livestock Institute), from *China Agricultural Development Report* and *China Statistical Yearbook*.

A study published in 2005³ attempted to reconstruct what has happened to cultivated land since 1949. According to its findings, the area of cultivation declined during the Great Leap Forward, then increased until 1979, at which point it reached its peak. A slow decline then set in until 1999, when cultivated land is said to have begun to disappear at an accelerated rate. Lastly, in late 2013, the Chinese authorities made public a survey carried out in 2009 which estimated the extent of cultivated land at 135.4 million hectares—that is to say, 13.7 million hectares more than the 121.7 million declared in 2012. This survey also apparently revealed 17.9 million hectares of forest, 25.5 million hectares of grassland and 3 million hectares of plantations. Several observers have noted that this publication coincides with another announcing that 12 million hectares were of poor quality land (vulnerable to flooding, on an incline greater than 25°, polluted etc.) and ought to be abandoned. The two announcements thus give no reason to change the figure for the area under cultivation, which is still above the 120 million that is set as the absolute lower limit.

The decline in cultivated land since 1949 can be explained by four factors: urbanization and infrastructures, natural catastrophes, ecological conservation projects, and land conversion⁴ (into plantations, aquaculture pens, forests and meadows). Over the last 50 years, each factor has contributed in different ways to how agricultural land has developed.⁵

Before 1978, the date when the reform began, infrastructure building was largely responsible for the land conversion that produced a decline in cultivated land (12 million hectares lost between 1978 and 1980). Between 1980 and 1996, land conversion involving the creation of a large number of plantations was the leading cause of the loss of agricultural land. Lastly, between 1997

³ FENG Zhi-ming, LIU Bao-qin and YANG Yan-zhao, 'A Study of the Changing Trend of Chinese Cultivated Land Amount and Data Reconstructing: 1949-2003', *Journal of Natural Resources*, vol. XX, 1, 2005, pp. 35-43.

⁴ Which the Chinese call 'agricultural adjustment'.

⁵ MAO Yushi, NONG Zhao and YANG Xiaojing, 'Food Security and Farm Land Protection in China', *Series on Chinese Economics Research*, vol. 2, 2013, World Scientific Publishing Company.

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and 2010, the most important factor was the 'Grain for Green' ecological restoration project carried out in response to urbanization.⁶

The main aim of this ecological restoration programme is to prevent soil erosion by restoring forests and grasslands in vulnerable zones. Hence, agricultural land has been turned into forest and grassland and bare earth has been planted with trees. The programme was implemented in two phases. Between 1999 and 2001, 400 counties in 20 provinces were designated to carry out the pilot phase, during which more than a million hectares of agricultural land were 'reforested'. Since 2002, the programme has been in full swing in 25 provinces and autonomous regions, and more than 1,800 counties, affecting 30 million rural households.

The intention was that almost 15 million hectares would be removed from cultivation and converted, but by 2012 only a little under 10 million had been—9 million being converted into forest and 0.6 million into grassland.⁷ Hence ecological restoration can be said to have accounted for almost 60% of the cultivated land that disappeared between 1997 and 2008.⁸

Conversions increased each year until 2003, when more than 2 million hectares of agricultural land came into the programme. From 2004 onwards, however, the authorities cut back the project and the areas converted fell to a mere 7,000 hectares in 2008. This decision may have been taken in reaction to a rise in agricultural prices and a constant rise in agri-food imports.

However, this project is not thought to have really affected Chinese agricultural production. The agricultural lands converted to grassland or forest were mainly sloping lands in remote and mountainous regions. Yields there were low by comparison with the land that continued to be cultivated.⁹ The farmers whose lands were converted were compensated with deliveries of cereals of between 1,500 kg and 2,250 kg per hectare, depending on the location, and a financial aid payment of 300 yuan (approx. 36 euros) per hectare for five or eight years, depending on the use to which the converted plots were put.¹⁰

Urbanization/infrastructure-building has been the second most important factor in the decline of cultivated land over the last 15 years, responsible for 20% of the cultivable land that disappeared between 1997 and 2008¹¹ and taking an estimated 2.5 million hectares for new urban use, a higher figure than in the period 1980 to 1996. This is also likely to play a major role in the coming years. Though less than 20% of the Chinese population was urban in 1978, the 50% threshold was passed in 2011. By 2012 more than 710 million Chinese lived in towns and cities, as against 172 million at the end of the 1970s. The Chinese authorities are planning for a 70% urban population by 2030, out of a total of 1.4 billion. This is a development the Chinese government wants to see happen, while wishing, nonetheless, to retain the greatest possible control over the pace of flight from the countryside, in order to avoid the creation of shanty-town areas in the suburbs of its major conurbations. Urbanization is therefore set to continue and to have a considerable impact on the availability of cultivable land.

⁶ *Ibid.*

⁷ SONG Xinzhang *et al.*, 'Chinese Grain for Green Program Led to Highly Increased Soil Organic Carbon Levels: A Meta-analysis', *Scientific Reports*, 4, March 2014, Nature Publishing Group.

⁸ LU Xin-hai and HUANG Shan-lin, 'Barriers of and Solutions to Farmland Conservation in China', *Journal of Huazhong University of Science and Technology (Social Science Edition)*, vol. 24 (3), 2010, pp. 79-84.

⁹ XU Zhigang *et al.*, 'Grain for Green versus Grain: Conflict between Food Security and Conservation Set Aside in China', *World Development*, vol. 34, 1, 2006, pp. 130-148.

¹⁰ TU Qin *et al.*, 'How Do Trust and Property Security Influence Household Contributions to Public Goods? The Case of the Sloping Land Conversion Program in China', *China Economic Review*, vol. 22, 4, December 2011, pp. 499-511.

¹¹ LU Xin-hai and HUANG Shan-lin, *op. cit.*

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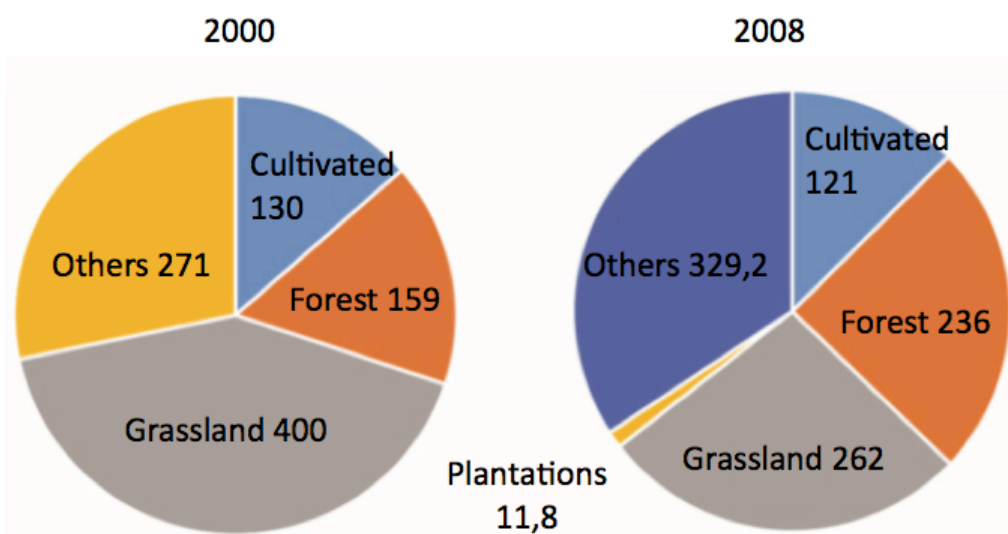
Let us not forget that, since the establishment of the Household-Responsibility System in the early 1980s,¹² agricultural land has been formally the property of the village collectives—and not of the households that use and manage it—for a period of 15 years in the case of arable land, extended subsequently to 30 years. This distinction between ownership and management underlies what are often illegal land transfers, with little or no compensation paid, on the initiative of the local collectives. Scandals around the seizure of village land by companies acting in collusion with local officials are currently widespread and have given rise to out-and-out peasant revolts. The central authorities make frequent reference to the changes that are needed in the management of land—changes that ought to make it possible to encourage the development of large farms. This move towards larger-sized land holdings has two aims in view: to achieve economies of scale and to raise farming incomes.

Since the 1990s, the Chinese authorities have strengthened the real rights of rural people over land and made conditions for transferring land-use rights more flexible, while retaining a framework of collective ownership. This trend has been facilitated in a number of ways: by the creation of a land register in order to clarify usufruct entitlements, by a toughening of the conditions of access to agricultural land (including forests and pasture land) for commercial and industrial enterprises, and by a system for monitoring these acquisitions.

There was a large amount of conversion of cultivated land—particularly into plantations—in the years following the agrarian reform that gave responsibility for crop-growing to households (the Household-Responsibility System). To meet the demand for the diversification of the Chinese food supply, and also export demand, and in order to increase their incomes, a section of Chinese farmers abandoned the growing of cereals and oilseeds and replaced these with plantations. Between 1978 and 2012, for example, the area planted with orchards increased sevenfold, so that it now totals 12 million hectares and the land assigned to tea plantations doubled in size.

It is not possible to acquire a correct grasp of the development of land use in China from official Chinese statistics (see Graph 2 below). Those statistics actually show a marked fall in grassland and a rapid increase in the area of afforestation, but the figures seem to reflect statistical revisions more than actual changes in land use.

Graph 2 — Division of Land in 2000 and 2008 according to official statistics (millions of hectares)



¹² The de-collectivization of agriculture brought about a redistribution of land to the advantage of households, based on family size. This institutional reform gave households a right of use and enabled them gradually to regain control over what was produced and access to the income from that production, while the land itself remained in collective ownership.

Serious Concern over Soil Quality

The reduction in the area under cultivation is not the only problem China faces with respect to land: the quality of soil is also a matter of serious concern. According to one study¹³, almost 60% of Chinese land is of average or poor quality and only 40% of good quality. The quality of soil is changing and its deterioration may be gauged from two angles.

First, from the flows of land withdrawn from agricultural production and newly brought into cultivation. The land taken by urbanization (factories, dwellings, offices etc.) is generally fertile land capable of producing high yields.¹⁴ By contrast, the land being brought into agricultural use (400,000 hectares in 2012 according to official Chinese data) is often of poor quality and located in low rainfall areas.¹⁵ Moreover, the reserve of potential arable land is only around 13.3 million hectares, more than 60% of which is in ecologically fragile zones.¹⁶

The other aspect of this question has much to do with industrial pollution and the patterns of technology use by Chinese farmers. One solution implemented to compensate for the lack of land has been the use of technical inputs to intensify production per hectare. China is, in fact, the world's largest consumer of fertilizer, using more than 55 million tonnes in 2010, a figure that has apparently more than doubled since 1990. India, which is the second largest consumer, uses less than 30 million tonnes. Studies show that the volume of fertilizer (NPK) per hectare often exceeds 500 kg,¹⁷ a figure four times higher than US usage, and the volume of nitrogen fertilizer can exceed 200 kg/ha,¹⁸ as opposed to an average of less than 80 kg in France. The use of pesticides in large quantities is also one of the peculiar features of Chinese agriculture. Its usage of 1.3 million tonnes in 2010 is 2.5 times higher than the world average. As a result, much of the remaining agricultural land is either degraded by the excessive use of fertilizers or polluted (with heavy metals etc.). In December 2013, the Chinese authorities themselves announced that 3.3 million hectares, a little under 3% of all cultivated land, was too polluted for farming use. A report published in April 2014 estimated that 20% of agricultural land was polluted by the mining industry or by agricultural activities. Cadmium, nickel and arsenic are among the pollutants most often found.

Lastly, according to Chinese official reports, 90% of pasture land is degraded to a more or less serious degree,¹⁹ and the April 2014 report mentions that 10% of pasture land exceeds the pollution limit set by the authorities.

¹³ HU R. and QIU D., “我国耕地保护形势与应对策略”, in *城市问题*, 12期, 2008. URL:

<http://www.cnki.com.cn/Journal/H-H1-CSWT-2008-12.htm>

¹⁴ TAN Shuhao, ‘Impacts of Cultivated Land Conversion on Environmental Sustainability and Grain Selfsufficiency in China’, *China & World Economy*, vol. 16, 3, 2008, pp. 75-92.

¹⁵ *Ibid.*

¹⁶ CUI Shunji and KATTUMURI Ruth, *Cultivated Land Conversion in China and the Potential for Food Security and Sustainability*. London: Asia Research Centre (London School of Economics & Political Science), *Working Paper* 35, 2011.

¹⁷ ZHOU Yuan *et al.*, ‘Factors Affecting Farmers’ Decisions on Fertilizer Use: A Case Study for the Chaobai Watershed in Northern China’, *Consilience: The Journal of Sustainable Development*, vol. 4, 1, 2010, pp. 80-102.

¹⁸ HUANG Jikun *et al.*, ‘Impacts of Training on Farmers’ Nitrogen Use in Maize Production in Shandong, China’, *Journal of Soil and Water Conservation*, vol. 67, 4, July-August 2012, pp. 321-327.

¹⁹ SEPA (State Environmental Protection Agency), *China Ecological and Environmental Situation Report 1998*. Beijing: SEPA, 1998.

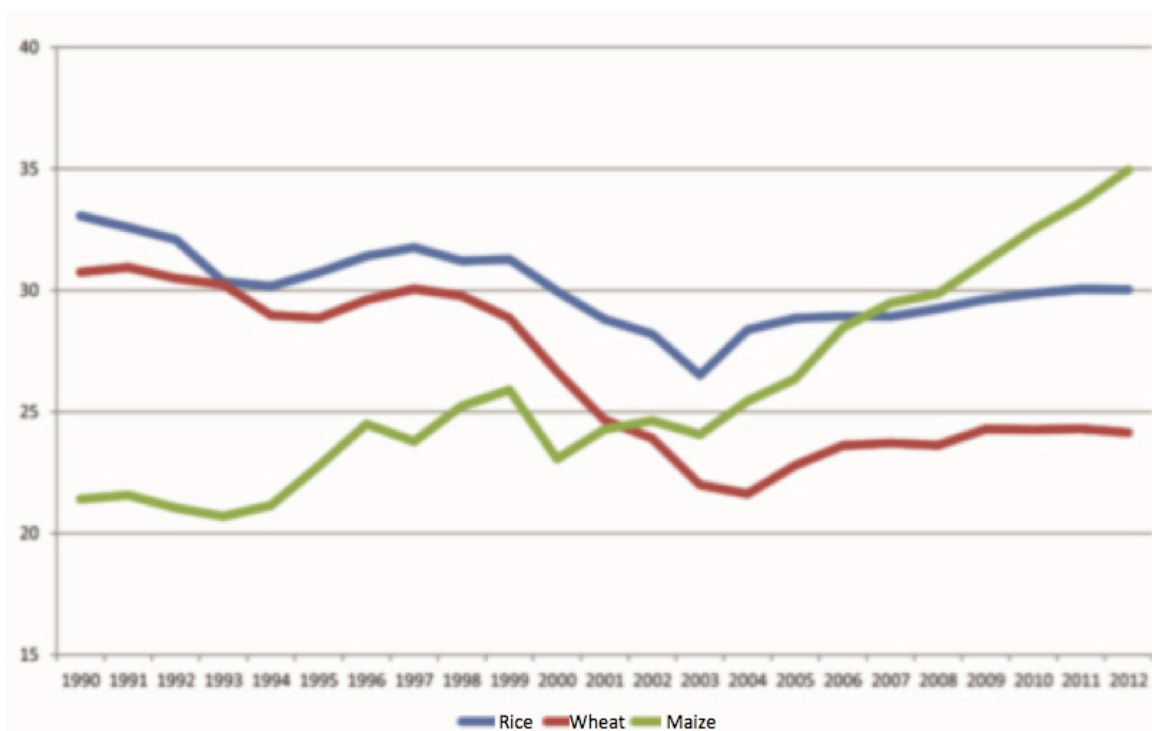
A Constantly Changing Pattern of Land Use

The end of people's communes, which gradually left farmers free to produce as they saw fit, and the diversification of the population's eating patterns have deeply transformed Chinese agricultural production and land use. In 1978, at the very beginning of the reforms, 80% of agricultural land (cultivated and plantation land combined) was taken up by grain production. By 2012, the proportion had fallen to 68% according to the official Chinese statistics, with cereal crops accounting for only 56%.

Above and beyond the increase in the amount of land given over to orchards and tea-growing referred to above, within the category of 'cultivated land' there has been a reduction in the area assigned to cereals and oilseeds and an increase in other kinds of produce. The land used for vegetable production has increased by a factor of six, sugar-cane by a factor of three and the land employed for tobacco production has doubled. The area assigned to the major—cereal and soya—crops has also seen changes of use. The area allotted to wheat, after decreasing greatly in the early 2000s, increased only slightly up to 2010 and has stagnated since. Only the area of land employed for maize growing is continuing to rise markedly (graph 3).

Graph 3 — Cultivated Area of Principal Cereal Crops in China 1990-2012

Millions of hectares



Source: Groupe Économie du Bétail-Institut de l'élevage (Cattle Economics Group, French Livestock Institute), from *China Agricultural Development Report* and *China Statistical Yearbook*.

The area assigned to soya growing is also sharply down since the mid-2000s (it fell by 25% between 2005 and 2012, passing below the 10 million hectare threshold), as a result of Chinese farmers' disaffection with the crop. According to BOABC (Beijing Orient AgriBusiness Consulting), the margin per hectare for soya was an average 5,700 yuan (circa 675 euros) in 2013, as against 10,500 yuan (1,245 euros) for maize. This discrepancy is deterring new farmers from soya-growing and the extent of soya cultivation fell by another 9% in 2013. The difference in margins here is partly explained by the lesser yields of oilseed crops and by domestic prices coming under pressure from imports, which are quota-free and also virtually

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tariff-free (3%).²⁰ This is the case because the explosion of domestic demand for soya oil and meal has produced a staggering rise in soya bean imports (63 million tonnes in 2013) which compete directly with local production.

The Chinese authorities seem, then, to have drawn a line under soya growing and to be putting their efforts into the cultivation of maize. In 2012, the Chinese Minister of Agriculture remarked that maize should not become a ‘second soya’, by which he meant that China should not become dependent on imports to satisfy its demand for that crop.

The Search for Land Outside of China

The economic development of China and its geophysical limits have clearly exerted major constraints on the availability of cultivable land. Above and beyond resorting heavily to the importation of raw materials—and also of processed goods such as dairy products—China has been trying for several years to safeguard its food supply by investing in agricultural real estate in countries renting or selling hectares of agricultural land. Though it is not the largest investor nation in the world, it is nonetheless, after the USA and Malaysia, one of the countries that buy or rent the most extensive areas of agricultural land.²¹

The strategy of ‘opening-up to the outside world’ was begun in the early 2000s, in order, among other things, to encourage Chinese investment abroad from private or public enterprises, and all economic sectors are involved. As a consequence, Chinese direct foreign investment (DFI) has risen from less than 5 billion dollars US per year in 2003 to 90 billion in 2012, though only 1% of this is in the agricultural sector. The implementation of this policy in the agricultural sector dates from the middle of the first decade of the new century and builds on a number of Chinese agricultural initiatives in the 1960s—based on agricultural assistance and cooperation—to produce crops for local markets.²²

Such a strategy is a response to recurrent imbalances between the domestic supply of agricultural goods and the consumption of households whose monetary resources are increasing with a rise in living standards that is producing a—by now familiar—process of nutrition transition.²³ The paradox inherent in the Chinese economy is evident here: the authorities regularly state that food self-sufficiency is their aim, but China is a country that can no longer satisfy its domestic demand for soya, cotton, palm oil and dairy products.

It is, then, the low ratio of cultivable land to population, emphasized above, that prompts a country like China to invest in other countries’ agricultural real estate. These investments are the consequence of an accumulation of financial surpluses, causing public or private players (sovereign wealth funds or big corporations like Wahaha or Reignwood, specializing in beverages and property) to look for sectors in which they can diversify their investment portfolios. Investment in foreign agricultural land is also intended to reduce China’s dependence on imports and, hence, on international markets, where the prices of the agricultural products traded may rise sharply, thus making Chinese imports more expensive (some forecasts suggest that, given the way the supply and demand parameters are moving, a ton of soya could reach a price of 600 dollars US by 2030).

²⁰ Imports of wheat, rice and maize are subject to tariff quotas at reduced rates of duty. Beyond the quota levels, imports are subject to customs duties of 65%.

²¹ See especially GABAS Jean-Jacques, ‘La Chine est-elle un accapareur de terres en Afrique? Retour sur une réalité mal acceptée’, *Futuribles*, 398, January-February 2014, pp. 25-36 (Editors’ note).

²² BRÄUTIGAM Deborah A. and XIAOYANG Tang, ‘China’s Engagement in African Agriculture: “Down to the Countryside”’, *The China Quarterly*, vol. 199, September 2009, pp. 686-706.

²³ CHAUMET Jean-Marc and POUCH Thierry, ‘La Chine au risque de la dépendance alimentaire’, *Revue OCL [Oilseeds and fats, Crops and Lipids]*, vol. 19, 5, September-October 2012, pp. 290-298.

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China's acquisitions of agricultural land have prompted a great deal of comment since 2007, the year when the global food crisis 'exploded' onto the world stage. We should, however, be wary of commentators drawing erroneous conclusions from the data—not least because of questions around the reliability of the figures and, indeed, of the contracts themselves, with intended purchases not always materializing (deals may be abandoned before completion). We know, for example, that the Land Matrix database does not take account of acquisitions below 200 hectares in surface area. In the year 2013, China acquired almost 1.6 million hectares of agricultural land worldwide, mainly in the Democratic Republic of Congo, Mozambique, Sudan, Liberia and Sierra Leone. Apart from the fact that this figure is quite low by comparison with US or Malaysian investments (8 and 3.6 million hectares respectively in 2013), sub-Saharan Africa is not the most favoured region of Chinese investors in terms of land area purchased. At almost 19% of all land investments, it ranks behind South America (37%) and South-East Asia (34%). On the other hand, Africa does come second in terms of the number of land deals (20 in 2013), right behind South-East Asia (43). Several of these Chinese investments relate to maize, rice, palm oil, sugar cane (intended for renewable energy production)—and also soya, wheat and groundnuts. It is evident, then, that China's objective in investing in agricultural real estate overseas is not strictly limited to safeguarding its food supply. That objective, essential though it may be, is accompanied by a concern to ensure supplies of energy from agricultural products.

The way Chinese agriculture has evolved and the way the process of industrialization has accelerated in China have led it to open up more to the rest of the world, first in sucking in the agricultural raw materials that it needs, generating significant pressure on prices, and then in positioning itself as one of the main foreign investors in cultivable land, so as to meet the demands of a level of economic growth which, even in a period of slowdown, remains high (at 7-8% per annum). The question is whether this strategy of direct overseas investment in the agricultural sector will continue and, if so, what economic and social consequences it will generate in the countries concerned? Will China plunder great expanses of land or will its investments in that sector be accompanied by forms of economic cooperation that are more beneficial to the Asian or African economies which have, for some years now, been its preferred targets?