A New Perspective on Animal Traction in Ethiopian Agriculture

by Hubert COCHET[1]

Abstract

The challenges of Ethiopian agriculture are a recurring theme in the scientific literature and regularly evoked with each food crisis. However, little research has addressed the contemporary transformations to Ethiopian agriculture in their diachronic and spatial dimensions. Drawing on fieldwork conducted in different rural regions, this paper discusses the transformations and contradictions associated with the widespread use of animal traction and the ard plough. We argue that the difficulties associated with accessing this production means have created unique social relations and explain socio-economic differentiation within the Ethiopian peasantry.

Keywords: Ethiopia – agrarian systems – social relations – ard plough – farming systems

Introduction

Agricultural and rural development are central concerns in Ethiopia. Characterised by high population density, a poorly functioning productive sector and the lack of off-farm job opportunities, rural Ethiopia faces many challenges, especially given its vastness and the environmental challenges agricultural development implies. The late 20th century famines are reminders of Ethiopian agriculture's extreme vulnerability. The last one (1999-2000) proved that famines in Ethiopia are by no means a thing of the past, regardless of climatic factors and political changes. Moreover, food shortages and famines are no longer exclusive to Ethiopia's drier regions (the Highlands of North and North-East and the warm, pastoral regions). Serious food-related tensions have emerged in southern parts of "green" Ethiopia (Planel 2005). Food aid has become so essential, regardless of acute food shortages or famine, that it has become structural.

The recurring famines that have plagued parts of Ethiopia for several centuries (Barbary 1990; Dessalegn Rahmato 2007; Gallais 1989; Pankhurst, 1985) indicate an age-old and profound agrarian crisis whose origins cannot solely be attributed to more recent phenomena such as population growth or degrading environmental conditions, as the literature often suggests.

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Although these issues have long been at the forefront of the political agenda and have fuelled many a passionate debate, particularly concerning landownership, studies concerning recent transformations in Ethiopian agriculture are still scarce and seldom based on enough field work to understand and quantify the changes taking place. Dessalegn Rahmato insisted recently on the want "of serious studies on Ethiopia's agricultural history and modern period" (Dessalegn Rahmato, op cit: 287).

This paper does not intend to fill this gap. Based on twelve years of research in rural Ethiopia, it does nonetheless shed some light on Ethiopian agriculture. By offering tangible, localised and scrupulously quantified results, the studies discussed here provide a baseline for future regional comparisons and effectively bring to light key issues that have emerged from ancient and recent changes to Ethiopian agriculture. We analyse these changes using animal traction as a proxy, given its long-standing role and prevalence in Ethiopian agriculture as well as its technological, economic and social relevance. Because much of the research presented here deserves to be studied in more detail and extended to other regions of the country, this article raises more questions than provides answers.

Concepts and methods for a renewed approach to Ethiopian agriculture

Given the challenges rising from contemporary transformations of Ethiopian agriculture, and the danger of hasty interpretations and overgeneralisations, it appears crucial to adopt a more comprehensive, holistic approach to Ethiopian agriculture. This paper argues for the need to revert to localized and systemic research and offers a renewed vision of the methods and concepts used to analyze agrarian situations.

Systems and overlapping scales

Farming practices and their transformations are considered herein as an integral part of an *agrarian system.* An agrarian system includes "both the operating mode and reproduction mode of one or more ecosystems, the corresponding technical baggage (tools, knowledge, know-how), the social relationships of production and exchange that have led to the implementation and development of this operating mode, the social division of labour and redistribution of added value, the mechanisms that differentiate basic production units, as well as the overall economic and social conditions, particularly those regarding the relative pricing system that enables the agrarian system to integrate world markets" (Cochet 2005) [2].

Eminently useful for a comprehensive understanding of agriculture, the agrarian system notion encompasses other concepts relevant to smaller scale

[2] Sea also Mazoyer (1987).

analyses. Take, for example, *cropping systems*. This concept is not used to analyse crops themselves but rather the way a farmer cultivates a plot (or several plots) of land. It includes the crop(s) that are grown (and how they are associated), the crop sequence, the techniques used and the order in which they are used for any given soil and climate conditions. For example, a crop sequence that starts with wheat and barley (in the 1st year), then changes to teff crops[3] (in the 2nd year), and is followed by a lentil and chick-pea cycle (in the 3rd year), constitutes a full-fledged *cropping* system, provided it is repeated regularly. An Abyssinian banana (*Ensete ventricosum*) crop, with its various stages of transplantations and the crops likely to be associated with it, can be studied as a cropping system.

The *livestock system* analyses domestic animal herd, and integrates aspects such as the herd characteristics (race, sex-ratio, size), its diet and corresponding foraging calendar, the upkeep of the herd (drives, breeding, health care).

The *production system* (or *farming system*[4]) is most relevant at the intermediate scale analysis of production and family units. It permits analysis the cropping and livestock systems a farmer uses based on available production means and workforce. Although the concept can be applied to the individual enterprise level, to help understand how the family farm functions thus enabling the formulation of personalised advice, it is more efficient to apply the *production system* concept to a group of farms with the same resources (same amount of surface area, same level of mechanization, same size of labour force) in similar socio-economic contexts, and which have a similar crop mix—in sum, a group of farms that can be represented by the same model (Cochet and Devienne 2006; Dufumier 1995).

Of course, family strategies often involve more than basic agricultural activities and can only be understood using a broader perspective called the *activities system* or "rural livelihoods" (Ellis 2000). Examples include beekeeping and complementary gathering, particularly in the agrarian system of south-eastern Ethiopia; complementary handicraft activities and seasonal migration can be found elsewhere in the country.

Our approach calls for a form of telescopic, multi-staged analysis that centres on three different levels; the first is that of the plot of land or the herd of cattle, where farming practices are studied; the second is that of the farm or production unit, where the different cropping and stockbreeding systems and other activities come together; the third concerns the region or micro region, and where the agrarian system is relevant. These three levels are not merely overlapping spatial scales; they represent three interdependent levels of functional organisation.

[3] *Eragrostis tef*, very fine grained cereals that originally grow on the high plateaux of Ethiopia.

[4] For the purpose of this article, the terms production system and farming system are used indiscriminately, although these two concepts are not always understood in the same manner. On this subject, see the comparative analysis by L. Fresco (1984).

Study of Ethiopian agriculture calls for a diachronic approach, but must not be limited to recreating a sequence of events. The approach must aim to understand how these events affected the farmer, and whether they changed his farming practices. It should identify and characterise the different periods that marked the evolution of agro-pastoral activities and determine the underlying causes of this evolution. After all, current productive systems are as distinct as they are diverse as a result of a historical process that merits careful reconstruction[5].

Micro regional approach and in-depth fieldwork

Between 1996-2007, graduate students under the author's supervision carried out a dozen studies in as many micro-regions of rural Ethiopia: the May Negus dam (near Axum) and the May K'eyih, south of Mek'ele, in the Tigray region; the slopes of the Wenchi volcano (near Ambo), the Mana *woreda* (district) in Jimmaa zone, in the Oromiyaa region; Welkite and Indibir areas (Gurage zone), some *qebele* (wards) of the Soddo, Ofa and Damot Gale *woredas* (Wolaita zone) and Sheeka and Wush Wush *qebele* on either side of the town of Bonga (Kaffa, Keficho zone), the Homa *qebele* (in Kambatta) in the South Nations, Nationalities and Peoples' Region (SNNPR) (see fig. 1).

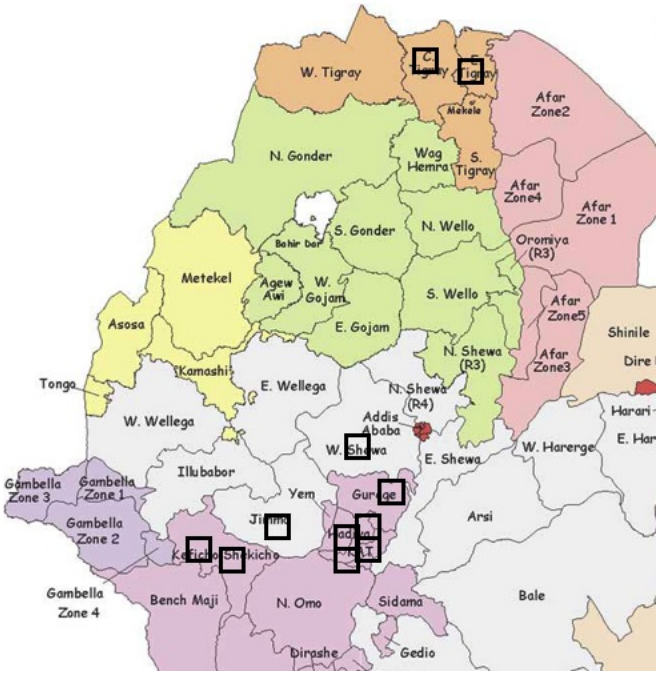

Fig. 1: Micro-regions where fieldwork was conducted

For each small region, researchers conducted six months of field work using an agro-economic methodology based on the agrarian system concept. Each diagnostic included four steps: a detailed analysis of the landscape; reconstruction of recent transformations affecting agriculture based on interviews with village elders and analysis of available documents; an in-depth technical-economic analysis of a sample of production units; and modelling of

[5]This historical approach to Comparative Agriculture is founded on methods and knowledge gained in very different historical and geographic contexts and is based on a functional analysis of the landscape and interviews conducted with members of the older generations (Cochet, 2005; Cochet, Devienne and Dufumier, 2007).

different production systems currently in use (Cochet and Devienne 2006).

These studies aimed to generate updated quantitative and qualitative knowledge of the rural, pastoral, and traditional economy in several Ethiopian regions, and to understand and explain current changes underway, be they regressive or progressive, so as to produce an overall analysis that accounts for regional particularities.

Challenges and paradoxes of animal traction in Ethiopia

Peasants have used the ard plough for cereal farming (notably wheat, barley and teff) for nearly 2000 years in the northern Ethiopian highlands. Still commonplace today, it seems to be continuously spreading towards the southern, south-eastern and south-western parts of the country. Ever since Emperor Menelik conquered the southern half of Ethiopia at the end of the 19th century and quite literally colonised the country, ard plough usage has spread, creating a "pioneer front" of ard plough tillage that advances at the expense of previously dominant manual farming practices.

The tool, its functions and its use

The Ethiopian ard plough is a symmetrical tool, made entirely of wood, except for the metallic end piece attached to the ploughshare with a socket. Contrary to the plough, a dissymmetrical tool with a mouldboard, the Ethiopian ard plough, like all ard ploughs, is not adapted to turning over the soil.

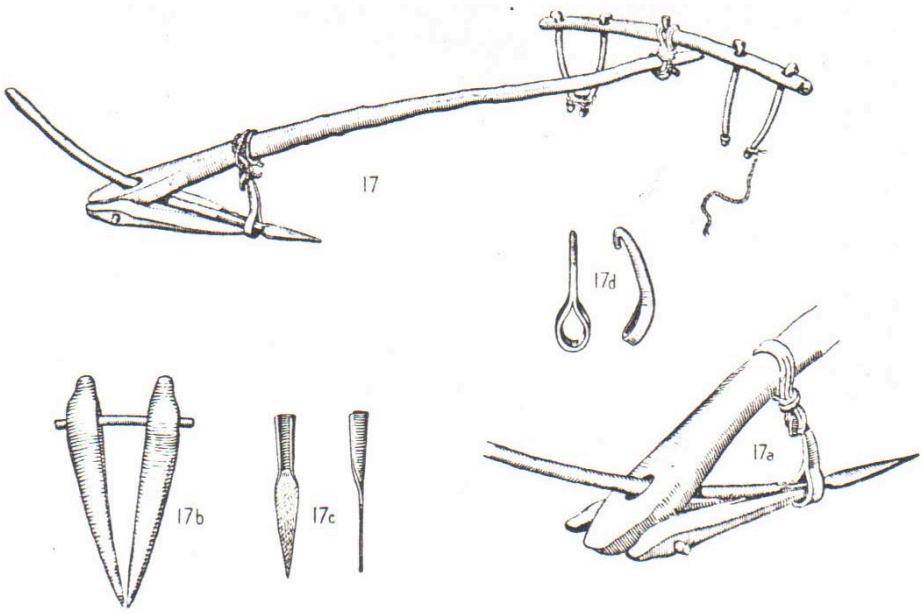

Fig 2: Drawing of the Ethiopian ard plough and its various parts (source: Vitali - Bartolozzi, 1939)

The main purpose of the Ethiopian ard plough is to prepare soil for sowing cereals. The tool is dragged through the soil in a series of perpendicular crossings (as many as six or eight crossings for teff crops) over the course of several months, between the previous harvest and the next seeding. The operation's purpose is to break up the soil and clean it, by removing weeds. The repeated crossings after the first rain of the wet season in particular, loosens the soil and removes weed growth.

In an arid climate like that of northern Ethiopia, where the grass cover struggles to grow in the short period between crop cycles, there is not much to turn over or plough, and the tool's main functions are to loosen the soil and destroy any weeds that have cropped up since the season's first showers. However, in the South, where wetter conditions are favourable to vegetal growth, the lush grassy cover must be broken up before planting, and the ard plough, to be of any use, must at least partially turn over earth clots, even if only superficially. Observation of how farmers handle the tool reveals that this is indeed possible, due to the wooden fins, pegged on either side of the draw bar, embedded both in the end of the frog and socket ploughshare (Fig. 2).

Thus although it is symmetrical, the ard plough partially turns the soil, because of the dissymmetrical manner in which it is used, provided the angle of the handle in relation to the vertical progression axis remains sufficiently open. The Ethiopian ard plough can therefore do what small turnwrest plough can, albeit not at the same depth. Furthermore, the reversible nature of the inclination makes it possible to cast the soil alternately to the left and to the right when travelling back and forth in the field, thus achieving flat ploughing[6].

In their study of the typological evolution of ard plough, André G. Haudricourt and Mariel J. Brunhes Delamarre saw the Ethiopian ard plough as a step forward in the tool's evolution: "As the ard plough starts to be used to loosen soil, the two identical parts move even further away from the centre part and increase in surface area, as is generally the case in Ethiopia." (1955: 120-121). Still on the subject of the fins on the Ethiopian ard plough, Haudricourt and Brunhes-Delamarre suggested that their relatively recent increase in size was related to turning the ard plough into a tillage tool (idem: 257). This particularly interesting evolution of the tool was more recently studied by Michael R. Goe (1989). According to this author, the oldest pictorial representation of an Ethiopian ard plough that resembles current ard ploughs, with a pair of fins, dates from the 17th century, and is therefore relatively recent compared to the first historical use of animal traction in that part of the world. The add-on of fins is undoubtedly indicative of an evolution of the tool's

[6] This helps explain the lack of success of the swing ploughs introduced during the Italian colonisation (simple plough that achieves a different type of tillage, with ridges). Furthermore, contrary to the Ethiopian ard plough, these tools were too heavy to be easily carried on the shoulder and required a greater force of traction.

functions, and requires further study[7]. Indeed, understanding this modification requires a diachronic approach to Ethiopian agrarian systems.

A grave fertility crisis in the northern highlands

Ethiopian agrarian systems in the northern half of the country, currently based on ard-ploughed cereal crops, are undergoing a profound crisis and show signs of widespread degradation. Environmental history studies show that the near total deforestation of the northern highlands is in fact very ancient. It probably dates back to at least the 16th century (McCann 1995) for much of the northern highlands, and even earlier in the Tigray region (Butzer 1981)[8]. There has been a considerable decrease of pasturelands (the *saltus*), diminishing periods of fallow, near total disappearance of tree cover (the *silva*) and, on the vast expanses of the northern plateaus, the extinction of all trees except for the odd, recently planted eucalyptus trees, generally surrounding a home. With cow dung being now the only available source of fuel for many rural homes, there is a shortage of manure and the traditional fertility transfers that were beneficial to crops have ceased. Furthermore, the depletion of grassy pasturelands has made it difficult to maintain a herd that is big and healthy enough to ensure breeding stock.

Regardless of the deteriorated state of ard plough-based cereal agriculture, it remains an ever-present reality in Ethiopia's rural life. In Northern regions where animal traction has been established for centuries, nearly no one uses manual tools to work the earth, at least as far as tillage is concerned. The extreme dependency on animal traction has forced many farmers to establish detrimental debt relationships in order to purchase the missing ox or in some cases, the entire team (*infra*). The same is happening in the southern regions, where animal traction is used along side other cropping systems (manually cultivated gardens, coffee plantations, etc.), systems that reduce very slightly this dependency.

The paradox of animal traction

The omnipresence of animal traction in modern Ethiopia has led to an astonishing paradox. Although the surface area of the average production unit is often small and does not require the use of animal traction, and hence does not justify, at least in theory, the purchase and maintenance of such an investment, many farmers consider access to this production means essential are prepared to make huge sacrifices to attain it. How then can this be explained?

[7] M. R. Goe provides a detailed study of the tool in itself, but does not linger on its handling and use... See also Gebregziabher (2006)

[8] See also McCann (1997).

In manual agriculture, the maximum surface area tilled by one farmer is no greater, in most countries with similar conditions, than half a hectare or a hectare, while the use of animal traction with the full equipment (animals and tools) enables one farmer to work on three or four hectares, sometimes even more. Hence, access to this animal traction was a remarkable innovation across the globe as far as agricultural development was concerned, in the Old World, Ethiopia included, as in the New World.

This, however, is no longer the case in rural Ethiopia. The surface area tilled by animal traction is rarely over a hectare per labourer, and an increasing portion of the population does not even have access to that amount of land. Although from a technical point a view, being able to prepare soil quickly and thus sow in a timely manner is crucially important for the crop cycle—this is why a team of traction animals is so important at this moment—the repeated crossings (up to 8 for *t'eff*) needed to eliminate weeds seriously limits the productivity gains over manual tillage.

As the general tendency for farms is to get smaller, an increasing number of farmers are passing below what could be described as the "profitability threshold" with regard to animal traction: the surface area that requires tilling is far less than the capacities of an animal traction team. It is remarkable that in many agrarian systems in Africa's highlands around the Great Lakes, where population density is comparable to that of the Ethiopian highlands, tillage is entirely carried out by hand and productivity rates are similar, if not greater than those observed in Ethiopia (Cochet 2004).

Nevertheless, for the most part, Ethiopian farmers in both the South and North, are prepared to make enormous sacrifices to attain the precious traction animals, and this despite the very slight difference in productivity. Therein is the paradox.

Access to animal traction: a function of social relations

The importance of traditional social relations in the ard plough's dominance

One aspect that merits study under a diachronic approach to Ethiopian agriculture, and that might help explain the exclusive use of light animal traction and the hegemony of the ard plough despite it's far from superior productivity, is the role of traditional social relations.

Much has been written about the taxation system gradually imposed on farmers in the northern Ethiopia from early on. One major question is whether there is a relationship between the widespread expansion of ard plough-tilled cereal crops and the property land tax regime. The considerable tax burden (25-30 per cent of production, towards tithes and corvées in northern

Ethiopia[9], and much more than that in the South after the conquest of Menelik II) was certainly due to productivity gains and surpluses made possible by the widespread use of animal traction at a time when environmental conditions, more favourable than today (vast open pastures for cattle, plentiful availability of firewood), allowed for more efficient mixed crop-livestock systems.

The expansion of ard plough-tilled cereal crops therefore occurred in tandem with that of the Empire and its taxation system that sustained those who no longer lived off the land. Hence, ard plough tillage would appear to be a prerequisite (McCann 1995: 81) to the spread of this taxation system. Indeed, the Empire appears to have encouraged it in a thousand different ways, especially in newly conquered peripheral regions of the annexation campaign. According to McCann, the ard plough's expansion was slow for the first 2000 years, directed from North to South. It picked up pace during the Oromo expansion in the 16th century, before accelerating again following the conquest and submission of southern Ethiopia by Menelik II (1995: 70).

The fact that the conquest of southern Ethiopia resulted in the forced expansion of cereal crops, and therefore of light animal traction, seems to be well substantiated (Gascon 2006). However, cereal crops, notably teff, are pre-existent in certain south-western regions, as is the use of the ard plough (Longe 1982; Orent 1979). In reality, it is not so much the fact that most taxes took the form of cereals (and particularly teff) that "encouraged" cereal crops and use of the ard plough,[10] but rather the considerable burden of such taxations, often reaching 30 to 50 per cent of the harvest. The high taxes simply would not have been possible without the simultaneous widespread expansion of a highly productive agrarian system, based on animal traction and favourable conditions.

The age-old, complex social relations of the old regime crystallised around land rights have been amply studied, particularly concerning Abyssinia (Crummey 1999). However, little is known of the relationship between these land tenure systems and the *modus operandi* of production systems. And while the relations between the peasant and ruling classes have been studied in-depth, little is known of the relations that developed between the farmers themselves, particularly when unequal access to cattle and traction animals led the more destitute farmers to beg. In the 1930s-1950s in the Tigray for example, peasants who owned traction animals held some distinction within the rural community, and demanded four-fifths of production from unequipped farmers to till their land (Marque - Rosenwald 1987). This example from Tigray indicates to what extent historical conditions for accessing productive capital—in this case traction animals and the necessary corollary, foraging lands—impacted the formation of modern production units and limited their development.

[9] Gallais (1989); 30% according to Crummey 1983:4.

[10] Hypothesis put forward for different periods and regions, by Amnon Orent (1979), McCann (1995) and Gascon (2006).

Lack of traction animals gives way to neighbourly arrangements

Nowadays, increasing vulnerability has led many families to seek out arrangements—regardless of the terms and conditions—to mobilise a team of traction animals. Among the multitude of arrangements, there are several situations:

- Farmers who only have one ox and need a second to complete the pair; both farmers will then take turns using the pair. (This arrangement has a specific name: *kotta*, *achetua* or *gatua* in the Wolaitta zone (Planel 2008; Le Gal – Molinier 2006), *taja* in the Kambatta zone (Barthès - Boquien 2005), *milifan* in the Tigray region (Marque – Rosenwald 1997), *karié* at Ambo (Habib 1996), etc.) This type of arrangement is widespread and is, in fact, an association of equals. Assembling the team often implies some form of collaboration in the tilling activities. Sometimes, a farmer may only own half an ox and thus must first come to an agreement with the ox's co-owner before searching for a second ox, that might also well be owned in co-ownership; this results in a partnership between four farmers who can each rely on one day of use out of four. In this particular case, the abovementioned paradox is resolved, as the association of several very smallholders fully justifies the sacrifices made to access a full team. The team is generally used at full capacity, and even beyond that.
- A very different case is the farmer who does not own an animal and thus must procure one; in exchange, part of his produce goes to the team's owner. The majority of farmers in the southern Ethiopia were brutally put in this situation after Menelik's conquest, as they were forced to increase the surface area of their cereal, particularly teff, crops.
- A third case is similar to the exchange of oxen for work. For example, in the Kambatta zone, the *agazu* contract enables unequipped farmers to borrow traction animals against three days of work for every one day of use; this arrangement is said to be disappearing because of the diminishing number of households that actually own a full team (Barthès – Boquien 2005). At Ambo, two days of work were enough to trade for the day's use of a team of traction animals, under the *lata* contract (Habib 1996).
- Oxen can also be rented for a cropping season. The rent is paid in cash.
- In other instances, the renter/borrower is responsible for the ox's care and nourishment in exchange for its use, but this form of custodianship seems a lot more commonplace with cows.

Apart from the first type of arrangement described above—association of "equal partners" who turn a common investment into a "profitable" operation—the social relations that revolve around animal traction always result in production loss (all the work cannot be carried out in a timely manner) and the payment of a crippling rent that gravely affects the survival capacities of the more destitute and their capacity for further investments.

Despite the paradox described above, there is a shortage of traction animals in the contemporary Ethiopian countryside. Even in the most densely populated parts of the country, such as the Wolaita zone, smallholders without

traction animals cannot work their lands. Although plots are small, production means are insufficient. Farmers are thus forced to relinquish land at a bargain price to cattle-owning neighbours (Le Pommellec 2000). High population density might lead us to think that land availability is the ultimate limiting factor, but in reality the main difficulty is the want of traction animals. In the Wolaitta zone, only fourteen per cent of farmers own or part-own a full team of traction animals; twenty-nine per cent only own one ox and forty-one per cent have no traction animals at all (Planel 2008). Three-quarters of farmers are involved in various forms of sharecropping (*idem*). Sixty per cent of the farmers in the Kambatta zone (*qebele* of Homa) have to make do without a working animal, according to Barthès and Boquien (2005). Draught animals in those regions are used to full capacity, but there are simply not enough.

It is therefore no wonder that social distinctions in rural communities are based on traction animal ownership (or, more precisely, on the capacity to put together, alone, a full team of traction animals), as well as the social relations that are forged around the creation of such a team. And yet, the capacity to maintain a team of traction animals over the long term implies the ability to upkeep a herd of at least ten animals that is likely to reproduce. Simple landownership is no longer enough.

As a result, there is an emerging trend in Ethiopia and many other parts of the world, whereby landowners no longer hold the dominant position *vis à vis* the tenant (or sharecropper), but rather find themselves dependant on whomever can supply the necessary production means. The result is a *reverse tenency* that plays against the landowner. Increasingly, access to traction animals, more than any other aspect, determines land access; cattle ownership (and oxen) has gradually merged with land access and control.

Indispensable cattle, vector of fertility transfers

In most of the Ethiopian highlands, cattle have been critical to crop survival as the manure gathered in the pen (or the house) where the cattle spends the night is used to fertilize cultivated lands. While this role has progressively disappeared from the northern highlands as an ever-increasing portion of manure is used as fuel, it has long gained in importance in the mosaic of agrarian systems in the South.

In these mountainous areas, the family home, often located near hilltops or along crests, is the central unit around which the garden is organised. Often some ten ares located at the heart of the production unit, the garden contains a rich variety of crops, looked after with the greatest care. The seemingly haphazard mix of species of different sizes and types may include food and cash crops, spices and medicinal plants, fruit or multipurpose trees. The living quarters feature an enclosure (live and/or dead hedge) that surrounds the vegetable garden (cabbages, beans, tobacco, etc.); one or two plots devoted to cereal crops, generally maize and/or sorghum; some roots and tubers (potatoes, sweet potatoes, taro); a small clump of banana or enset trees; a few coffee plants; and sometimes some *ch'at*. Because these richly diversified

garden-orchards surround the house and are used as living areas, they receive daily care and benefit from all, or nearly all the available fertility. In addition to the ashes from the hearth and composted domestic waste, the gardens also receive the manure collected from the cattle pen.

Enset plantations, unique to Ethiopia, are abundant in much of southern part of the country. A food crop with high calorific yield compared to the surface area needed, enset is particularly suited to densely populated areas. It is the object of sophisticated gardening techniques (in terms of the productive process and subsequent transformations) in some regions (Gurage country). But the image of relative prosperity associated with this "green" Ethiopia (even in the dry season), needs to be put into a broader perspective. An enset plantation requires such quantities of dung at each and every stage of its development that it would not survive any prolonged interruption of fertility transfers.

Beyond the hedges that surround the gardens, and beyond the enset plantation, lie annual plant crops, mainly cereals and vegetables, but also sometimes tubers and roots. Despite proximity to the garden and absence of a clear boundary, this is an altogether different world, where annual crops alternate with fallow periods when there is enough land. Contrary to the gardens that benefit from most of the manure, these open fields are rarely fertilized with dung. Their fertility depends on chemical fertilizers and, therefore, on the farmers' budget. Yields seldom exceed 10 quintals of grain per hectare per annum, and often reach only half that amount.

Ethiopian farmers are so keen to get their hands on a pair of oxen, or at least one ox, because of the multifunctional character of this type of cattle. A small herd guarantees upkeep of the garden and justifies the time spent minding the cattle in pastures, or if pastures are not available, along paths (often designed to be quite wide, for this specific purpose).

Animal traction and agro-economic differentiation: evidence from the field

Despite the Derg regime's "dumbing down" of the Ethiopian peasantry and its monolithic image, it remains diversified, mainly due to unequal access to production means, primarily animal traction. Indeed, access to animal traction is so decisive that income disparities are often greater between inhabitants of the same region who are part of the same social network, than between farmers living in different parts of the country, despite differentiated access to natural resources.

The abovementioned fieldwork carried out in different regions of the country reveals marked distinctions among the peasantry within each one of these micro-regions, as well as differentiated productivity and income levels. The estimations of size given as examples in the following paragraph are particularly noteworthy.

The densely populated heart of Wolaitta/Kambatta

In the *woreda* of Damot Gale (Wolaitta zone), farmers who are better off have a little more than 1 hectare of land (1.1) and exploit an additional 0,5 or 0,6 hectares by virtue of renting out their traction animals and the small herd they maintain to replace the oxen as needed. Their income, self-consumption included[11], amounts to 250 to 260 Euro per active farmer per annum (Le Gal – Molinier 2006), not even 0,75 Euro per day per farmer; the income for the majority of other producers is well below this. In the same region, for "medium" sized exploitations, with about half a hectare of land and a single ox, in ownership or custodianship, farm income does not exceed 60 to 100 Euro per active farmer per annum. As for the more destitute families, struggling on tiny 0,2 hectare farms with no traction animals, annual income is no more than 30 to 40 Euro per active farmer per annum, which represents an annual income of around 100 Euro for the entire family. Income varies 7:1 within the same region; land disparities are approximately the same[12].

A little further to the North, in the *qebele* of Homa (Kambatta), income disparities are approximately the same; "big" farms of 1 to 1,5 hectares that revolve around 25 are of profusely manured enset plantations thanks to some ten heads of cattle can generate an annual income of 250 to 300 Euro per farmer, including self-consumption. Smaller farms without animal traction must resort to manual farming or relinquishing half their land and only generate around 100 Euro per farmer per annum. Very small farms, with 10 are or less, earn 25 to 30 Euro per farmer per annum (Barthès – Boquien, op cit). The range of incomes is therefore very similar to Damot Gale, with disparities slightly more pronounced in Homa.

The households in the densely populated *woredas* of the Wolaitta-Kambatta zone are thus characterised by very low incomes and huge disparities within the same communities, where a large proportion of families live in misery. The extreme poverty in these regions forces some farmers to sell their entire crop to pay their debts and to buy their daily food. Each year, these families struggle to find seeds, and the choice of crops depend largely on the seed available to them. This situation, found virtually no where else in the world, makes it impossible to plant the crops and crop associations that are best suited to each location and season. Because plantation often depends on last minute opportunities for obtaining seed, the natural cycle is offset, which entails further yield losses and offsets of the next cycle, in regions where it is possible

[11] To correctly assess the economic efficiency of a rural production unit and measure its income, self- consumption must be accounted for. Neglecting to factor in family consumption (often the majority of production) amounts to confusing "farm income" and "monetary income".

[12] Disparities in monetary income are even wider in the Ofa *woreda* in eastern Wolaitta, ranging from 45 to 500 Euro per active farmer in 2006, *i.e.,* a 1:10 ratio (Byakweli 2000).

to have two cycles in the same year. The farmer is then caught in a downward spiral of vulnerability that is difficult to escape from.

South-Western Ethiopia

Around Jimmaa, incomes appear slightly higher thanks to coffee plantations, despite price fluctuations in international markets. Production units are also slightly bigger as population density is lower. Large expanses of coffee plantations on the slopes of "v"-shaped thalwegs separating two hills enable the majority of farms to supplement their income. The smaller production units, with only 0,5 to 0,75 ha (the average surface area of farms in the densely populated heartlands of the Wolaita!) and one ox, manage to generate an income of 100 to 240 Euro per farmer per annum. Large landholdings (2 or 3 hectares of land) with a full traction team and a relatively dense coffee plantation, can generating over 500 Euro per farmer per annum (Bayon and Placet, 2000). Income disparity is lower in this region (a 1:5 ratio) and average income, although modest, is higher here than anywhere else.

The Kaffa zone

Incomes in the Kaffa zone are similar to those observed around Jimmaa: around 100 Euros per farmer per annum for smaller farms with just a garden or for those forced to relinquish part of their land in exchange for animal traction, and around 500 Euro per farmer per annum for farms of 3 to 5 hectares, with a full traction team and a big enough herd to ensure breeding stock (Ortiz – Salvado 2004; Bareaud 2007).

The northernmost regions

Much further to the north, in the Tigray region, the detailed investigations revealed some surprises. In these particularly vulnerable semi-arid zones, the overall farm income is higher than the rest of the country, reflecting the fact that farms are big enough to justify the use of traction animals, when they can afford them. However, income disparities are even higher in these zones, as the lack of gardens forces the more destitute members into total dependence on traction animals owned by neighbours or relatives. The income disparities observed by Marque and Rosenwald in 1997 were at a 1:20 ratio. While wealthier families (2-5 hectares per farmer, a full traction team, sometimes two, and breeding stock) can generate an income per farmer that reaches 800 Euro per annum, the poorer families, without an ox, currently struggle to earn roughly 40 Euro per farmer per annum.

Even though the Ethiopian countryside is extremely diversified and contrasted in terms of the farming techniques and their effects on the landscape, a comparative analysis of some aspects of agrarian reality reveals that the income disparities greater among neighbours who share the same hill or valley than between the various regions of the Ethiopian farming mosaic.

This result is surprising insofar that it challenges the image of undifferentiated rural communities as well as the misconception that southern Ethiopia is a sort of "green" El Dorado compared with its northern counterpart, destined to endure the worst food catastrophes.

Conclusion

Despite the diversity of Ethiopian landscape — a genuine mosaic of highly differentiated agrarian systems — animal traction and its socio-economic consequences is crucial to understanding productive systems and their dynamics countrywide. The problem is not so much the "stagnation" or "archaism" of farming techniques: farming practices have evolved. Rather, the challenges faced by Ethiopian farmers lie in increasingly difficult access to the most basic production means (traction animals, tools and even seeds), the relative rise of cost of input (in particular fertilisers) and the loss of subsidies: all added burdens to a worsening situation.

This paper reflects on the preliminary results of the *AgroParisTech*'s research programme on Ethiopian agrarian systems. The new empirical data has proved particularly valuable for getting past sweeping generalisations and generalities. By expanding the boundaries of a technical approach to include analysis of social factors and by taking a holistic, comparative approach to agrarian life, the research offers a fresh look at Ethiopian agriculture and its recent transformations.

Bibliography

Maïwenn BAREAUD (2007), *Analyse-diagnostic d'une petite région agricole du sud-ouest de l'Ethiopie (Wishwish, zone Kafa),* Master dissertation, Comparative Agriculture and Agricultural Development Research Unit, AgroParisTech / IRD.

Virginie BARTHES – Nathalie BOQUIEN (2005), *Analysis diagnosis of an agricultural region of southern Ethiopia (Kambatta, Homa kebele),* Master dissertation, Comparative Agriculture and Agricultural Development Research Unit, Institut National Agronomique Paris-Grignon / French Center of Ethiopian Studies, Paris – Addis Ababa.

Maud BAYON – Christophe PLACET (2000), *Farming systems study in Jimma area (Ethiopia),* Master dissertation, Comparative Agriculture and Agricultural Development Research Unit, National Agronomic Institute, Paris-Grignon, France.

Karl W. BUTZER (1981), "Rise and Fall of Axum, Ethiopia: a geo-archaeological interpretation", *American Antiquity,* vol. 46, n° 3, p. 471-95.

Jean Marie BYAKWELI (2000), *Dynamique de systèmes agraires du sud-ouest de l'Ethiopie: cas du woreda d'Ofa au Wollayta occidental*, Master dissertation, Comparative Agriculture and Agricultural Development Research Unit, INAPG (120 p. + annexes).

Hubert COCHET (2004), "Agrarian Dynamics, Population Growth and Resource Management: the Case of Burundi", *GeoJournal, An International Journal on Human Geography and Environmental Sciences* n° 60, p. 111-22, Kluwer Academic Publishers, The Netherlands.

Hubert COCHET (2005), *L'Agriculture Comparée, genèse et formalisation d'une discipline scientifique*, Institut National Agronomique Paris-Grignon, Paris (88pp).

Hubert COCHET – Sophie DEVIENNE (2006), "Fonctionnement et performances économiques des systèmes de production agricole: une démarche à l'échelle régionale", *Cahiers Agricultures,* vol. 15, n° 6, November-December 2006, p. 578-83.

Hubert COCHET – Sophie DEVIENNE – Marc DUFUMIER (2007), "L'agriculture comparée: une discipline de synthèse ?" *Economie rurale* 297-98 / January-March 2007, p. 99-110.

Donald CRUMMEY (1983), "Ethiopian Plow Agriculture in the Nineteenth Century", *Journal of Ethiopian Studies,* vol. 16, p. 1-23.

Donald CRUMMEY (1999), *Land and Society in the Christian Kingdom of Ethiopia, from the Thirteenth to the Twentieth Century*, University of Illinois Press, Urbana and Chicago (373 pp.).

Olivier DEHEUVELS – David DERREY (1998), *Study of the Gurage Farming Systems (Ethiopia),* Master dissertation, Comparative Agriculture and Agricultural Development Research Unit, National Agronomic Institute, Paris-Grignon.

DESSALEGN Rahmato (2007), "La pauvreté et la recherche de la sécurité alimentaire", in: Gérard PRUNIER (ed.): *L'Ethiopie contemporaine*, Paris : CFEE-Karthala, p. 285-308.

Marc DUFUMIER (1995), "Understand Complexity: classification of farm holdings for diagnostic analysis of agrarian situations", *The Rural Extension Bulletin* 7, p. 17-23.

Frank ELLIS (2000), *Rural livelihoods and diversity in developing*, New York: Oxford University Press.

Louise FRESCO (1984), "Comparing Anglophone and Francophone Approaches to Farming Systems Research and Extension", *Farming Systems Support Project Networking Paper* N° 1 (36 p.).

Jean GALAIS (1989), *Une géographie politique de l'Ethiopie, Le poids de l'Etat*, Fondation Liberté Sans Frontières / Economica, Collection Tiers Mondes (213 pp.).

Alain GASCON (2006), *Sur les hautes terres comme au ciel, Identité et territoires en Ethiopie*, Paris: Publication de la Sorbonne.

GEBREGZIABHER Solomon et al. (2006), « Animal drawn tillage, the Ethiopian ard plough, *maresha*: a review », *Soil & Tillage Research* 89, p. 129-43.

Michael R. GOE (1989), "The Ethiopian *Maresha*: clarifying design and development", *Northeast African Studies* vol. 11, Number 3, 1989, p. 71-112.

HABIB Omar (1996), *Study of the Farming Systems in the Ambo region in Ethiopia*, Master dissertation, Comparative Agriculture and Agricultural Development Research Unit, National Agronomic Institute, Paris-Grignon, France.

André Georges HAUDRICOURT – Marielle J. BRUNHES DELAMARRE (1955), *L'homme et la charrue à travers le monde*, Gallimard, Lyon (La Manufacture, coll. L'homme et la nature).

Werner LANGE (1982), *History of the Southern Gonga (Southwestern Ethiopia),* Wiesbaden.

Elodie LE GAL – Nicolas MOLINIER (2006), Agricultural and Economic Analysis-Diagnosis of Obe Jage (Damot Gale, Wolaita), Master dissertation, Comparative Agriculture and Agricultural Development Research Unit, National Agronomic Institute, Paris-Grignon, France.

Marion LE POMMELLEC (2000), *Gestion de la fertilité, intensification et diversification: pratiques paysannes et processus d'innovation dans la région de Soddo, Wolaita, Ethiopie*, Master dissertation "Développement Agricole Tropical", CNEARC/INAPG/CFEE (173 p.).

Cécile MARQUE – Valérie ROSENWALD (1997), *The Agrarian Systems in a Small Region of Northern Ethiopia*, Master dissertation, Comparative Agriculture and Agricultural Development Research Unit, National Agronomic Institute, Paris-Grignon, France.

Marcel MAZOYER (1987), *Dynamique des Systèmes Agraires, Rapport de synthèse présenté au Comité des systèmes agraires*, Paris: Ministère de la Recherche et de la Technologie.

James C. MCCANN (1995), *People of the plow. An agricultural history of Ethiopia 1800-1990*, Madison: The University of Wisconsin Press.

James C. MCCANN (1997), "The plow and the forest. Narratives of deforestation in Ethiopie, 1840-1992", *Environmental History*, p. 138-59.

Amont ORENT (1979), "From the Hoe to the Plow: A study in Ecological Adaptation", in: R.L. HESS (ed.), *Proceedings of the Fifth International Conference of Ethiopian Studies,* Chicago: University of Chicago, p. 187-94.

Ariel ORTIZ – Salvado ARLINDO (2004), *Agricultural and Economic Analysis-Diagnosis of Obe Jage (Damot Gale, Wolaita),* Master dissertation, Comparative Agriculture and Agricultural Development Research Unit, National Agronomic Institute, Paris-Grignon, France.

Richard PANKHURST (1985), *The History of Famine and Epidemics in Ethiopia prior to the Twentieth Century*, Addis Ababa: Relief and Rehabilitation Commission.

Sabine PLANEL (2008), *La chute d'un éden éthiopien: Le Wolaita, une campagne en recomposition*, Paris (IRD éditions, coll. A travers Champs).

Giovanni VITALI – Enrico BARTOLOZZI (1939), *Strumenti agricoli indigeni dell'Africa Orientale Italiana*, Regio Istituto Agronomico per l'Africa Italiana, Firenze (Relazioni e Monographie Agrario-Coloniali, no 52).

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