

GLOBAL LAND OUTLOOK

WORKING PAPER

LAND VALUE CHAINS

Giancarlo Raschio

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POLICY SUMMARY

The Agrifood business (production, processing, transportation, and commercialization to final consumers) has changed dramatically in the last fifty years. Rather than being carried out via linear supply chains, agrifood business is now conducted in complex networks spanning the globe. It can, in other words, be said that modern agrifood business is conducted under the form of Global Value Chains (GVC). The main characteristic of a GVC is a fragmented production of goods and products across borders.

An agrifood GVC can be defined as either buyer-driven or producer-driven. The former is led by supermarkets, whereas the latter, by manufacturers. In between, there are key intermediaries such as large traders. These lead companies wield most of the power within the agrifood GVC.

Lead companies detain great power when it comes to determining prices and influencing farming practices, thanks to their economies of scale and access to international markets. Farmers engage with these companies via contract farming agreements (CFA), which set the terms for what, how much, when, and at what price their produce will be purchased. Such CFAs might not always be perceived as fair by farmers, but are, nonetheless, usually perceived as the best available alternative rather than being cut-off from markets.

Given the fragmented and international nature of agrifood GVCs, and, in addition, the increasing and fierce competition in the retail sector, lead companies must ensure that their operations are cost-effective, that their products maintain certain quality levels, and that they comply with desired social and environmental performance norms. To achieve this, lead firms conform to private and public standards, also implementing them in their supply chains.

Compliance with public and private standards provides positive impacts in terms of assuring consumers that the food they purchase has a set quality level and that its production didn't generate negative socio-environmental impacts. However, the adherence to certain standards can often represent a burden for smallholders. Usually, small-scale farmers do not have the financial and technical resources to implement, and sustain compliance, with rigorous standards, and thus risk being excluded from a retailer's value chain. Smallholders, therefore, face three options: to upgrade in order to comply with the standards, to downgrade within the value chain, or to exit the value chain entirely, and enter into traditional or informal markets.

Smallholders' welfare is similarly affected by other business practices conducted by large retailers. These include: delays in payments; participation in promotional events that translate into lower sale prices; products offered to consumers at no cost (e.g., 'buy one, get one free' promotions); and cosmetic standards (e.g., shape of fruit and vegetables).

Those farmers that cannot keep up with the requirements of supermarkets face exclusion from their value chains. Once excluded, farmers either enter local markets, informal markets, or abandon their farms entirely, looking for better opportunities in other activities. Farmers wishful of abandoning their farms can sell to firms willing to implement large plantations, thus consolidating agricultural lands. In other cases, farmers might only be able to make profits by selling larger volumes of products, being thus impelled to seek larger agricultural areas, which often - particularly in developing countries - leads to land use change and deforestation.

Policy options, both private and public, must aim to address the power imbalance that currently exists in agrifood GVCs, thus giving smallholders better bargaining opportunities.

Public policies can include financial mechanisms that incentivize sustainable practices in agriculture, as well as ensuring fairer deals between supermarkets and smallholders by guaranteeing fair prices. Public policies should also work to help farmers overcome market failures that prevent them from accessing international markets, and which therefore leave them with little choice but to accept the terms of large corporate buyers. Private policies should focus on assuring fair CFAs in their agrifood supply chains and on providing adequate support (technical and financial) to farmers groups that lack the resources to implement and maintain private standards, thus risking not reaching the final consumers.

1. TRADE AND AGRIFOOD GLOBAL VALUE CHAINS (GVCS)

Trade, as a mechanism, was theoretically intended to efficiently allocate immovable land resources so as to match global supply and demand, thus leading to improved global prosperity, while simultaneously distributing environmental pressures among the least sensitive ecosystems. In reality, however, trade has displaced considerable environmental pressures from developed to developing countries, which usually have weaker enforcement capabilities of environmental standards (Yu et al. 2013). Whereas the proportion of global resource extraction traded among countries was 10% in 1970, in 2010 it had grown to 15% of all the resources extracted in the world (Fischer-Kowalski et al. 2015). Over the past fifty years the value of the international agricultural and food trade has increased around fivefold, however the profits resulting from this appreciation have not been evenly distributed throughout the regions of the world (high-income countries have outdone developing countries) (FAO 2015a).

Historically, human settlements have arisen in geographies where resources were relatively abundant, thus facilitating the later industrialization of such settlements. The general reality of resource scarcity in absolute terms, however, generated a demand from industrialized settlements for raw materials. Neighbor territories thus became dedicated to their extraction (and, to some extent, processing) for their own consumption, and for that of the industrialized centers as well. Although industrialized centers also extracted some raw materials on their own, they became specialized in processing such resources to generate added value (Fischer-Kowalski et al. 2015).

Before the Industrial Revolution, the availability of food and, thus, the likelihood of survival was determined by agrarian cycles; however, the development and evolution of technology since the first industrial revolution have reshaped the boundaries of production (G Gereffi and Luo 2014). According to Baldwin (2006), the key transformations of international trade follow two sequential unbundlings that took place after the late 19th century - a period when factories had their production lines located close to their consumers, either sequentially, or in separate but contiguous units. The first unbundling took place thanks to steam-power, which reduced transportation costs. Although production was now distributed internationally, it was still clustered locally, so as to reduce costs. With the significant lowering of costs in communications, information and transport came the second unbundling, that allowed locally clustered production to be replaced by a network of specialized international suppliers spread around the globe (Baldwin 2006). During the Second World War, developing countries from the South were, in essence, resource suppliers for countries in the North. This changed during the decade of 1980 with trade liberalization adopted by many emerging economies (Fischer-Kowalski et al. 2015). Evidence of this development is the fact that today the share of South-South trade accounts for almost one-third of global trade, whereas North-North trade has diminished; the North is now a major exporter to the South (B. Lee et al. 2012).

The activities that compose the agrifood industry (production, transportation, processing, wholesale, and consumption) developed in two stages over the past fifty years. The first stage, "pre-liberalization/pre-globalization", took place from 1950 to early 1980, and involved public investment measures which encouraged the shift from small- to large-scale agriculture. The second stage, "liberalization/globalization", started in the early 1980s and continues still today. This second transformation involved trade liberalization, increasing urbanization, higher incomes, and significant fluxes of Foreign Direct Investment (FDI). Equally, it is this second stage which is characterized by multinationalization, the appearance of private standards, and vertical integration (Reardon et al. 2009).

Development has shifted markets from being fragmented (i.e., multiple village markets) to being de-fragmented, meaning that a concentration of goods from many different places is sold in one place. The de-fragmentation occurred first with dry goods (i.e., grains), and then later with fresh products, such as meat, dairy and vegetables. Before the rise of large retailers - such as supermarkets - fresh products were sold by smaller retailers and family businesses. Factors such as accelerated urbanization, and improvement and expansion of road infrastructure, lead to the sale of fresh products in de-fragmented markets (Reardon et al. 2003).

The definition of how inputs flow from producers (i.e., farmers), through added value processes (i.e., processors), to the direct sale to consumers (i.e., via supermarkets) has evolved over time. In the 1970s, the process was defined as a “commodity chain”, which described a set of linked processes until the final finished product. Then, in the 2000s, appeared the notion of Global Value Chain (GVC), which is similar to commodity chain, but differs in the fact that it tries to describe globalized industries. It is the concept of the GVC that emphasizes “networks” over “chains. In a globalized market it makes more sense to describe economic processes as complex “circuits”, with multiple loops and links, rather than as a linear flow of processes (Hernández et al. 2014).

Global Value Chains (GVC) are defined as the internationally fragmented production of goods and services, for which a cross-border movement of resources (i.e., know-how, capital, and human resources) is required (Taglioni and

Winkler 2014). GVCs “involve trade in goods that have multiple production stages that take place in many different countries...and in which multiple imports and exports of intermediate goods are necessary to produce a final good, which may also be exported” (Ferrantino and Taglioni 2014). Food products are produced in international chains that involve both developed and developing countries. Depending on the product, both developed and developing countries can play different roles (i.e., as suppliers or via value-added activities) (Hernández et al. 2014). Particularly in the case of developing countries, participating in GVCs means that they are fully integrated in global manufacturing networks (Taglioni and Winkler 2014).

Decisive factors that contributed to the development of GVCs included: lower transport, information and communication costs; swift improvements in technology; and reduced barriers for international trade and capital flows (Fig. 1) (Amador and Cabral 2014).

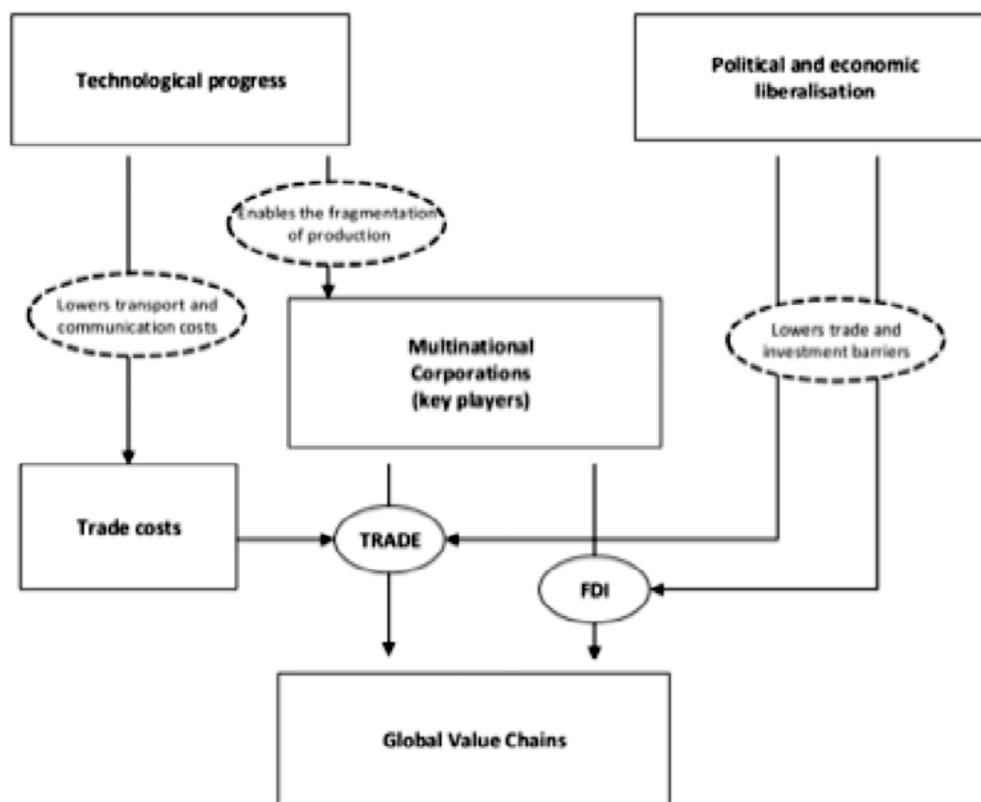


Figure 1: Main drivers of Global Value Chains
Source: Amador and Cabral 2014

GVCs are responsible for about 80% of global trade, and 30% of value added in economies of developing countries (Abdulsamad et al. 2015). GVCs create new opportunities for market reach and profit generation, but they also generate new risks for companies (previously protected by market boundaries and geographical distance), and also increase information asymmetry (Gereffi and Luo 2014).

In globalized agrifood chains, power has shifted towards retailers. Supermarkets and manufacturers are the key lead firms in “buyer-driven” agrifood GVCs, and they exert significant power over the agrifood value chains as a whole. Supermarkets have grown larger in both developed and developing countries, creating links between consumers globally, and small-scale farmers, in often remote areas. Supermarkets’ huge buying power and well-known brands allow them to enact cost-cutting measures, and to implement high standards, which their suppliers must abide by, if they are to remain part of the supermarket’s value chain. Manufacturers also constitute lead companies in “producer-driven” agrifood GVCs. They impact small-scale farmers by influencing in their farming activities and by controlling the international trade of large-scale commodities (J. Lee et al. 2012).

This article focuses on supermarkets, their roles in agrifood GVCs regarding small-scale farmers, and land use. Supermarkets are the link between consumers and small-scale farmers, and are, thus, responsible for passing the preferences of consumers (i.e., as regards quality, social and environmental criteria) on to suppliers. This article will also present key information regarding the impacts international traders have on farmers, since they are intermediary players as regards both retailers and manufacturers. Finally, the article presents policy options to improve the leverage small-scale farmers have in agrifood GVCs, aiming at improving their livelihoods and reducing negative impacts on land use.

2. STRUCTURE OF AGRIFOOD GVCs

Two main types of companies participate in agrifood GVCs. On the one side, there are lead firms (i.e., supermarkets and manufacturers), these are typically multinational corporations with headquarters in developed nations, who have control over price, delivery, and performance in both producer-driven and buyer-driven GVCs. On the other side of the equation, there are farmers who produce the goods and services for the lead firms (Gereffi and Luo 2014).

Within GVCs, lead firms hold control over the chain. Retailers and global brands have great control over their supply chains because of their purchasing power, despite the fact that they usually do not own production and processing plants themselves (Abdulsamad et al. 2015). In “producer-driven” chains, manufacturers of the final product detain most power (this is characteristic of industries that require significant capital, technology, or skills). In “buyer-driven” chains, retailers or marketers of the final product detain most power because of their well-known brand names, which strongly influence consumers’ purchasing decisions (Gereffi and Lee 2012).

Global buyers play a powerful role in buyer-driven chains. Retailers such as Walmart and Tesco, as well as well-known brand-name merchandisers (e.g., Starbucks, Adidas) can determine how suppliers behave by requiring them to comply with certain standards. For example, Walmart with its 8,100 stores, distributed in 15 countries, and total annual revenue of USD 401 billion can exert significant power over suppliers, and even countries (it is China’s seventh largest trading partner) (Gereffi and Lee 2012).

Large and powerful companies in agrifood GVCs tend to work with fewer suppliers, usually focusing on those which are well-structured, closer to consumer markets, and which are able to manage key value chain activities (i.e., financing production all the way to final distribution). This form of organization leads to a concentration of power at the top of GVCs; the bottom of GVCs, meanwhile, remains significantly more competitive and fragmented. Small local firms have little opportunity to perform high value activities in the chain, and remain only as subcontractors, in a “captive relation” with larger actors in the value chain (Abdulsamad et al. 2015).

Finally, lead firms use standards, or codes of conduct, as a form of private governance within food GVCs to direct the type, quantity, and quality of products to be produced (J. Lee et al. 2012). The emergence of such standards are not only a response to inadequate and weak public governance, but are also a means to address consumers’ concerns about environmental and social issues related to supply chains (e.g., deforestation, child labor) in an increasingly complex marketplace (Abdulsamad et al. 2015).

3. GOVERNANCE OF AGRIFOOD GVCs

Governance is a fundamental part of GVC analysis because it shows how firms can distribute profits and risks within the industry (Gary Gereffi and Lee 2012).

Usually public governance is not strong in food GVCs. Given the geographical spread of production sites and supply chains within GVCs, coupled with the low institutional capacity and weak regulatory enforcement capabilities usually extant, governments in developing countries often find it challenging to effectively regulate business operations of food GVCs in their jurisdictions (Abdulsamad et al. 2015).

Local governments usually face a complex situation regarding regulation of lead companies in food GVCs. On the one hand, they don't want to impose strict controls, and thus risk losing the economic development (i.e., via employment and taxes) brought about by international businesses. On the other hand, governments usually provide generous incentives to large international companies, which, in turn, results in limited economic growth (Abdulsamad et al. 2015). This results in a dilemma wherein low-labor costs and incentives are key to enter food GVCs and attract investors, however the investments in question generate limited benefits to the country beyond minimum wages, and offer limited opportunities to generate value within the value chain (Abdulsamad et al. 2015).

Private governance of agrifood GVCs involves complex interactions among private and public actors, as well as with civil society. These interactions can be separated into three categories (Fig 2). The first category refers to an "horizontal" relationship between lead firms, actors of civil society, and institutions in the consumer countries (where standards are defined and created) (Abdulsamad et al. 2015). For example, NGOs usually push companies to hold themselves accountable for the environmental and social impacts of their activities, even when such impacts originate in long supply chains very often beyond the remit of individual countries (e.g., deforestation caused by the production of commodities, such as palm oil and cacao) (Styles et al. 2012). The second category refers to a "vertical" relationship between the lead firms and their first-tier suppliers that deals directly with local suppliers in developing countries (Abdulsamad et al. 2015). For example, leading responsible retailers assess compliance with standards and codes of conduct by their second- or subsequent-tier suppliers by incorporating monitoring tools, such as chains of custody under the responsibility of their first-tier suppliers. As an example, Carrefour Brazil implemented a policy to eliminate deforestation from its supply chains of meat product (Styles et al. 2012). The third and final category relates to the horizontal relationship between large intermediaries and local firms, producers and local civil society institutions in the country where production takes place. At this stage, the standards and codes of conduct designed in consumer countries are implemented in supply chains.

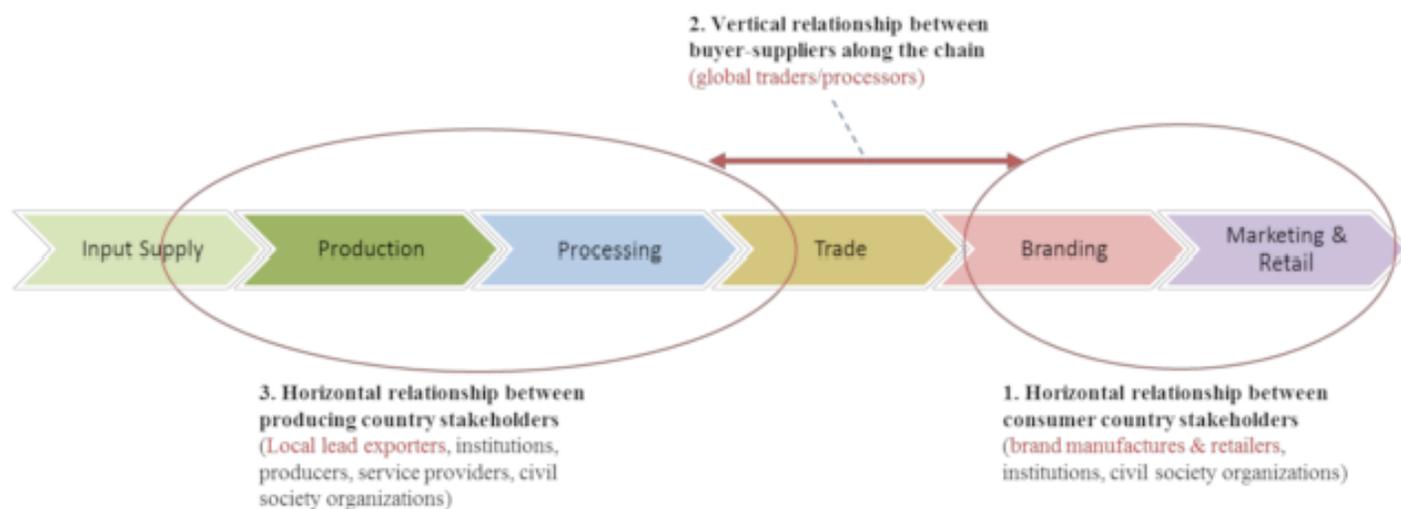


Figure 2: Key actors and relationships in GVCs setting standards and codes of conduct
Source: Abdulsamad et al. 2015

4. SUPERMARKETS

The agrifood GVC links agricultural activities to downstream activities in what is known as agrifood business. The agrifood GVC is, however, controlled by only a few companies, which serve as a link between small producers and consumers around the globe. (Hernández et al. 2014)

In “buyer driven” GVCs, supermarkets are lead firms, and international traders are key intermediate players. Supermarkets determine how products are cultivated, harvested, transported, processed and stored by implementing private and public standards. Producers must abide these standards to be included in value chains (Gereff and Lee 2012). International traders are key intermediate players who work with supermarkets to improve their logistical efficiency, reduce transaction costs, and enforce private standards and contracts on their behalf (Brown and Sander 2007).

Supermarkets have become global sourcing companies, allowing them to buy from low-cost and labor-intensive locations, which, in turn, increases the number of suppliers and the amount of competition among farms worldwide. Farmers must therefore supply large volumes per client transaction to remain competitive. Small-farmers are often squeezed out of the market; this can occur for a number of reasons, such as cases where: they lack economies of scale, their investment inputs are limited, and/or they have insufficient access to market information. Usually, those that can meet the requirements are large-scale farmers (Brown and Sander 2007). Supermarkets generally prefer large-scale suppliers, since the scale of the operation reduces the risk of a variation in quality and in the timely delivery of produce. For example, in Kenya, in 1992, about 75% of the fresh fruits and vegetables (FFV) for export was sourced from small-scale farmers, whereas, in 1998, the four largest exporters only sourced 19% of FFV from small-scale farmers. Also in 1998, in Zimbabwe, the five largest exporters only sourced 6% of FFV from smallholders (Brown and Sander 2007).

The share of FFV sold in supermarkets is increasing. Although this might be good for producers, most of the gains are captured at the top of the supply chain. The FFV sector is a buyer-driven GVC. So - although supermarkets do not own farms, processing facilities or importing companies themselves - they do in fact have control over the ‘what’, ‘where’, ‘how’, and ‘by whom’ aspects of production (Brown and Sander 2007).

Finally, it is important to keep in mind that supermarkets are businesses with a mandate to maximize profits for shareholders; they are not development agencies. They must cater to consumers’ demands and quality requirements. For these reasons, it is important to identify policy options, both public and private, aimed at providing more leverage to small-farmers, albeit without compromising the business activity of supermarkets and the supply to consumers.

5. SUPERMARKETS AND THEIR EXPANSION IN DEVELOPING REGIONS

During the 1980s, supermarkets in developing countries were predominantly domestic chains serving only a small niche of the high-income population. Then, during the 1990s, international supermarket chains began to spread to developing countries (McCullough et al. 2008).

The expansion of supermarkets in developing nations took place first in Latin America, then Asia, and finally Africa. This development first happened in large/rich cities in Latin America, then East/Southeast Asia, then in poor countries in Latin America and Asia, including Central America and Southern and Eastern Africa, and finally South Asia. In ten years Latin America experienced the same development of supermarkets that the United States experienced in fifty years. During and before the 1980s there were supermarkets, but these were financed by domestic capital, and served only a niche market, representing 10-20% of national food retail sales; by the year 2000, supermarkets occupied 50-60% of national food retail, which is close to the 70-80% share in the United States and France. East/Southeast Asia followed Latin America five-to-seven years later, but with a faster growth (Reardon et al. 2003).

After entering large cities in developing countries, supermarkets expanded from primary cities to secondary cities, and, in some cases, even into small towns. This diversification was driven by reductions in costs resulting from higher organizational and supply chain efficiencies, as well as from increasing competition among retail companies (McCullough et al. 2008).

Gaining control over the fresh food market occurs more slowly. The first category over which supermarkets gain control is that of commodities (e.g., potatoes) as well as sectors involving consolidation in their first stage of processing (e.g., chicken, meat, and fish). Supermarkets need to invest in improving the efficiency of their procurement of fresh food, whereas local markets and fairs are more competitive as they offer fresh food for daily shopping at lower costs. In Latin America, fresh food comprises one half the share of processed foods; in Southeast Asia, 15-20%, and 30% in East Asia outside China and Japan (Reardon et al. 2003).

In the three regions mentioned, supermarkets dominate the processed, dry, and packaged foods sectors, being able to provide low prices thanks to their economies of scale (Reardon et al. 2003).

According to Reardon et al. (2003) there were many factors supporting the expansion of supermarkets in Latin America, Asia (excluding Japan) and Africa, but only a few of these overlap with those that drove the development of supermarkets in the European Union (EU) and the United States.

The supermarket expansion in these three developing regions can be attributed to demand and supply system factors.

Demand system factors included:

- Urbanization, which lead, particularly, to more women entering the workforce, and thus looking for easier shopping alternatives, such as the simplicity of processed foods; Low prices practiced by supermarkets;
- Higher mean per capita incomes and a rapid rise of the middle class, which increased the demand for low-cost processed foods;
- During the 1990s more households owned refrigerators, thus making it possible to preserve fresh goods, which shifted grocery shopping from a daily activity, in the local retail shop to a weekly/monthly activity, in supermarkets. Ownership of cars also motivated this change in shopping trends.

Supply system factors included:

- Foreign Direct Investment (FDI). Before the 1990s, there was only limited domestic capital invested in supermarkets. After the 1990s, large supermarket chains from developed countries saw an opportunity to gain higher margins and face less competition by investing in developing supermarkets in the three afore-mentioned regions. Also, liberalization policies of retail sectors contributed to attract FDI. For example, Carrefour's margins in Argentina, in the 1990s, tripled those from its operations in France. FDI grew five to ten fold in these regions during this decade.
- The supermarket sector in these regions is increasingly controlled by multinationals (via FDI). Multinationals represent about 70-80% of the top five supermarket chains in most countries. Similar to the United States and EU, the sector is rapidly consolidating in these regions. For example, the top five chains at the country level control 65% of the supermarket sector, compared to 40%, and 72%, in the United States and France, respectively. This consolidation occurs firstly by the acquisition of domestic chains, and secondly by the absorption of smaller chains by domestic chains. It is also worth noting that multinational firms have far easier access to capital, from their own liquidity, and from more cheaply available international credit than that which is accessible to domestic companies.
- The development of new information technologies also allowed for more effective and efficient logistics, and supply chain management. More efficiency leads to higher savings, which are then invested in new stores, thus fueling competition, and reducing prices for consumers.

6. FACTORS DRIVING THE DEVELOPMENT OF FOOD GVCS

6.1 Population growth

The rate of population growth is slowing down. Taking into account the drop in the fertility rate, the global population is expected to reach 9 billion, by 2050 (Fig. 3). Most of this growth (around 87%) will take place in developing countries (UN 2015). Population growth is expected to go hand-in-hand with an increase in income. The "global middle class" is projected to include 4.9 billion people, in 2030, a 172% increase from the 1.8 billion, in 2009; most of this increase will take place in Asia (OECD Observer 2016).

Fertility has been decreasing since 1960, in all the regions of the world (Fig. 4). In the twenty years between 1950 and 1970, global population increased by 1.2 billion (0.06 billion/yr); in the following thirty years, between 1970 and 2010, the increase was of 3.2 billion (0.1 billion/yr). United Nations (UN) projections estimate a population increase of 2.8 billion between 2010 and 2050 (0.08 billion/yr) (Fig. 5). In other words, the rate of population growth is slowing down. There is, nonetheless, growth in population despite this lower fertility rate because most people are at a reproductive age, thus the rate of replacement remains higher than that of decline.

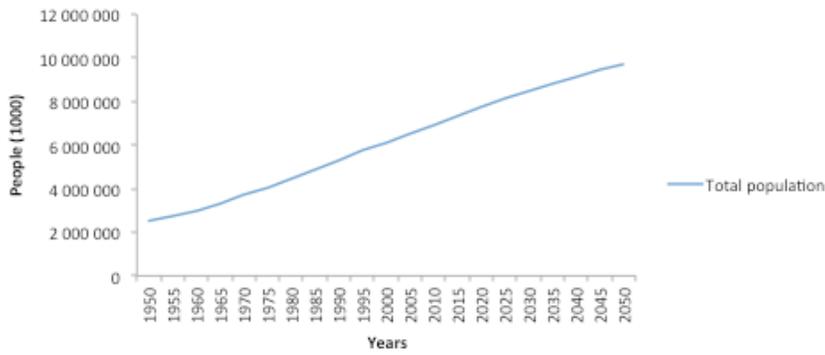


Figure 3: Global population growth by 2050
Source: UN 2015

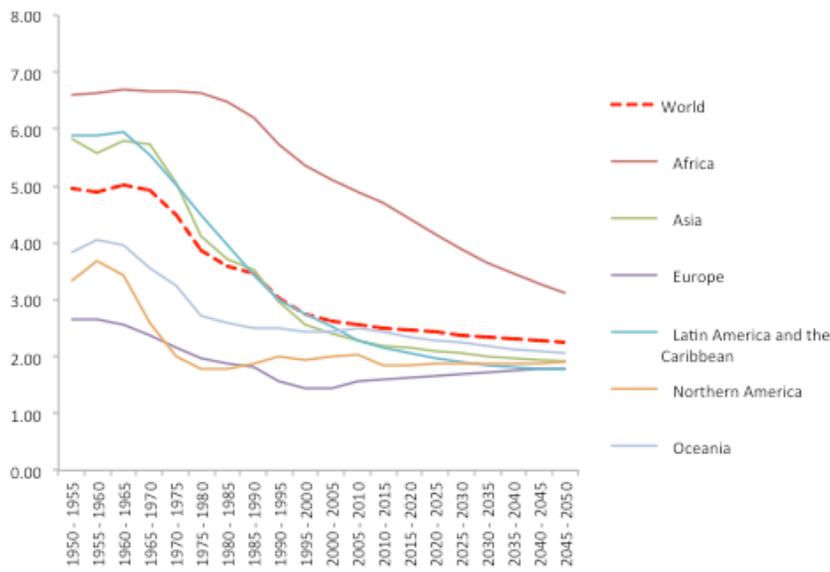


Figure 4: Total Fertility (children per woman) 1950-2050
Source: UN 2015

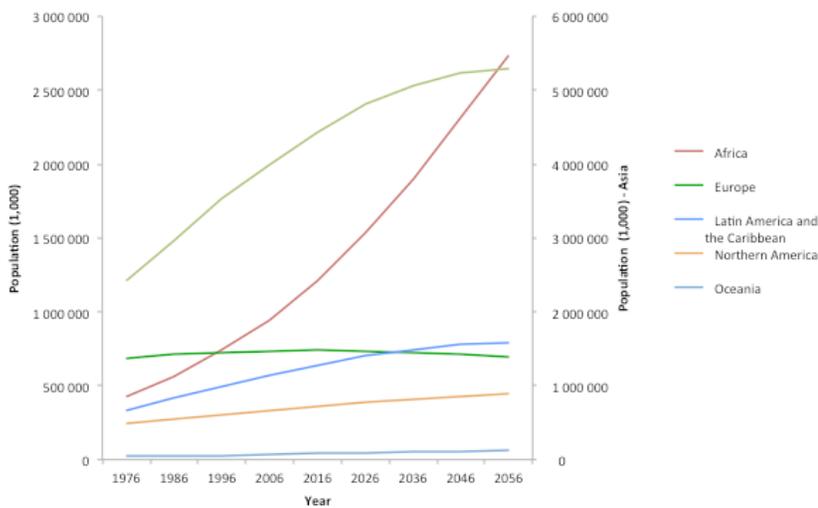


Figure 5: Total population by region in 2056
Source: UN 2015

6.2 Urbanization

In 2010, nearly 50% of the world population was living in urban areas; by 2050 this figure is expected to rise to 70% (Bringezu et al. 2014).

Rural areas at the edge of large urban areas are being taken over by the latter, as the city expands (UNEP 2016c). Such expansion is defined as urban sprawl, and is usually unplanned, scattered, and results in the fragmentation of agricultural land at the interface between urban and rural areas (Bringezu et al. 2014). If the current rate of global population growth and the average densities of cities both continue to decline, then urban areas in developing countries will still triplicate by 2030, as their population doubles (Fig 6).

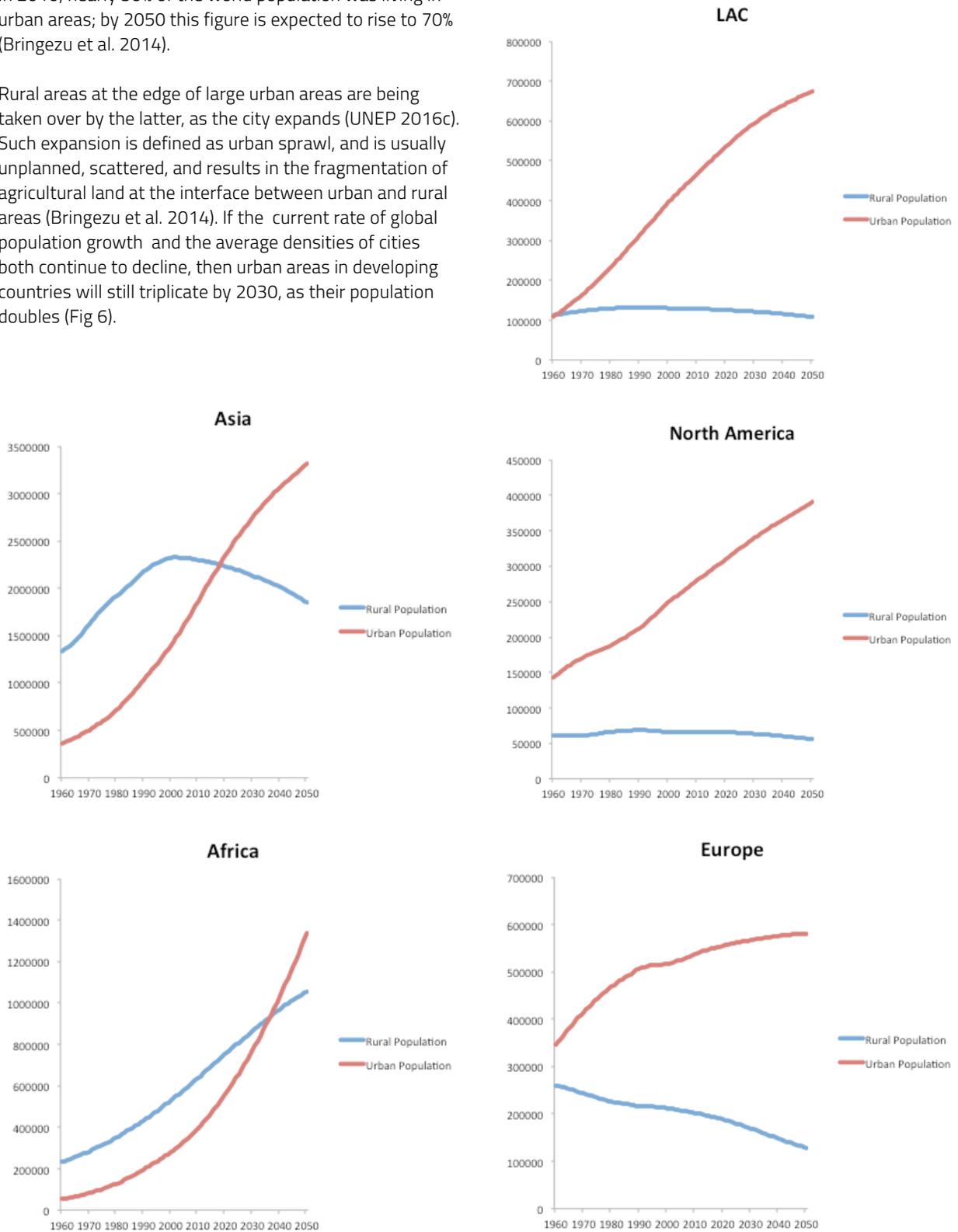


Figure 6: Expected trends in growth of rural and urban population by world regions

Source: Author

6.3 Changes in diet preferences

Higher incomes are reflected in the eating preferences of households, which tend to shift their diets towards the consumption of more processed foods and more meat (OECD 2016).

Higher incomes, changing diet preferences, and urbanization have led to diversifications in diets. In developed countries, cereals account for only 37% of total caloric intake; in developing countries, they provide 54% of caloric intake; and, in least developed countries, this rises up to 71%. Global meat consumption is projected to increase at an annual average of 1.4% up to 2024, thus resulting in an additional consumption of 51 metric tons (Mt.) of protein-sourced caloric intake per capita; this increase is expected to occur in developing countries across all income levels, while remaining stable in developed countries. Even with this significant increase, per capita meat consumption in developing countries will still remain at less than half that of developed countries (FAO and OECD 2015).

7. AGRIFOOD GVCS, BIOMASS AND LAND USE

Biomass materials are renewable resources that include all raw materials from plant and animal origin (agricultural products, harvest by-products, grassland harvests, biomass grazed by livestock, timber, and hunted animals). Biomass production represents the largest share of anthropogenic land use, with the highest proportion allocated to food production (Fischer-Kowalski et al. 2015). Most of the socio-economic use of biomass relies on plant-based biomass that is consumed as food or fodder. Durable goods, such as wood and fibers, represent only a small fraction of biomass. It is estimated that nearly three-quarters of all extracted biomass is used (directly or indirectly) to feed the global population; out of this, one-third ends-up as food waste (Fischer-Kowalski et al. 2015).

The agricultural sector, and the food production chain as a whole, have transformed significantly over the past decades. Until the middle of 1990, productivity rose alongside population growth, thus supplying the population with food while using the same amount of land posed little difficulty. This, however, is expected to change in the future, for it is thought that demand may grow more swiftly than capacity of supply (Bringezu et al. 2014). In 1900, biomass use was 5 billion tons and represented 75% of all materials use in the world. By 2010, the amount of biomass used had increased to 21 billions, yet only represented 30% of global materials use (Krausmann et al. 2009).

In 1970, traded biomass comprised 10% of global production; in 2010 this had risen to 15% (Bruckner et al. 2012). The trade of biomass increased from 641 million tons in 1980, to 1,721 millions in 2010, representing an

increase of 168%. From this total, food represented the largest share of traded biomass, accounting for 47.3%, of which cereals represent 22.6%; this is followed by biomass-made products (including paper and beverages) at 25.7%; forestry products accounted for 17.5%; fodder, for 9.7%; and animals and animal-based products, for 8.7% of the total trade of biomass in 2010 (Fischer-Kowalski et al. 2015).

The continued industrialization of agriculture is a result of the combination of growing demand for dairy and meat products from an emerging middle class in countries such as India and China, as well as a consequence of lower yields, and rising prices. The transition to a privatized agriculture is also a result of neo-liberal modes of governance, globalization, de-regulation, adoption of WTO rules for agriculture, and financialization¹ (Barker 2007). The expansion of the international trade of food, fertilizers, and pesticides was rendered possible due to the revolution of information technology, which also allowed for the development of genetically modified organisms (GMOs): the so called "Green Revolution" (Bringezu et al. 2014). Altogether, international agricultural trade has increase ten-fold since the 1960s (Hazell and Wood 2008).

Focus on productivity lead to a reduction in the varieties of crops being produced, which shrank to a narrow number of only high-yield varieties. For example, before the Green Revolution, about 42,000 varieties of rice were grown in India, whereas nowadays only a few hundred are (Hertwich et al. 2010). Similarly, his focus led to the genetic modification of plants so as to obtain pest-resistant and high yield varieties, which, in turn, led to the development of crop varieties which are highly dependent on fertilizers and pesticides.

According to data from Kastener et al. (2012) there was an increase of 30% as regards harvested cropland area between 1963 and 2005 (840 to 1,100Mha), with the largest share (50%) driven by land used for animal products. Stimulants such as coffee, tea, and cocoa represent 7% of total cropland used for food, even though these crops are produced for their cultural values, and not for their energy content.

¹ Financialization is a fairly novel term that refers to the increasingly important role of investors. According to Murphy et al. (2012), financialization is "[in the context of food and farming] financialization refers to the growing involvement in agricultural production, processing, and distribution of a range of finance institutions which have never before invested in agriculture – asset management companies, private equity consortia, merchant banks, superannuation/pension funds, hedge funds, sovereign wealth funds, and others" (Murphy et al. 2012).

Although these changes in agriculture were partly driven by population growth, it cannot be assumed that a stabilizing population level will translate into a stabilization in land pressures. Conversely, changes in diets are expected to put significant additional pressures on land resources (Kastner et al. 2012).

In 2013, land dedicated to agriculture represented about 33% (4,930 million hectares [Mha]) of the world's total land area, with cropland representing about 10.5% (approximately 1,57 Mha). Land used to establish new cropland increased by 14% (192 Mha) between 1961 and 2013 (FAO 2015b).

Land cannot itself be physically traded, however it is considered to be "embodied" in consumed products and services. Embodied land (also known as "virtual land") refers to the area of land (actual and hypothetical) required for (directly or indirectly) the production of goods or services. Kastner et al. (2014) found that between 1986 and 2009, the area of cropland for domestic consumption remained stable on a global level, whereas that used for export production increased by over 50% (Kastner et al. 2014). The expansion of embodied land in the imports of one country must come at the expense of the availability of land in the producing country (i.e., the exporter) (Fischer-Kowalski et al. 2015). For example, a study by Meyfroidt and Lambin (2010) identified that the land use embodied in timber imports offset 74% of the reforestation efforts in twelve studied countries. In other words, the land being recovered as newly planted forest in the country importing timber was being correspondingly lost in the country it was getting its timber from. This phenomenon is known as deforestation displacement (Meyfroidt et al. 2010).

At the start of the 21st century, the majority of farms belonged to smallholders without land security; these farmers were, thus, susceptible to being deprived of their land by large agribusiness investments, and, as result, would often migrate to large cities (Bringezu et al. 2014). The scarcity of productive land leads both countries and companies to attempt to secure land rights over lands in foreign (usually developing) nations; this activity is known as "land grabbing" and can create a variety of negative social impacts (Fischer-Kowalski et al. 2015).

Trade in biomass is related to population density: countries with high population density need to import biomass to satisfy their demand, whereas countries with low population density have both sufficient labor and available land to produce and export biomass to supply international demand. Of course this distribution also depends on the existence of other factors that either facilitate or impede production and trade (i.e., infrastructure, technology, conflicts, etc.). In 2008, Europe had the largest volume of biomass trade (imports and exports), followed by Asia and North America. Regarding net suppliers of biomass

(exports minus imports) North American countries ranked first in 2008, followed by Latin America and Asian countries (Fischer-Kowalski et al. 2015).

Latin American countries are important suppliers of biomass given their low population density and natural resource abundance. Their net exports of biomass have increased substantially, in particular if upstream requirements are accounted for (Muñoz et al. 2009). On the other hand, Europe is balanced in terms of imports-exports of biomass, thus meaning that it is self-sufficient regarding biomass materials and trade (Schoer et al., 2012 in Fischer-Kowalski et al. 2015).

Under current conditions, the net expansion of cropland will be in the range of 120 to 500 Mha between 2005 and 2050. This expansion will occur predominantly in developing countries, and mostly as a result of the shift to protein-rich diets, as well as due to the production of biofuels. If we also consider the displacement of cropland which occurs due to urbanization and land degradation, the net expansion is in the range of 320 to 850 Mha (Bringezu et al. 2014). Although these estimates appear alarming, they are not the worst-case scenarios considering the estimations of global land use scenarios developed by the Netherlands Environmental Assessment Agency. These scenarios project a cropland increase of between 1,500 Mha to more than 1,600 Mha by 2050, taking place mostly in Africa, Latin America, and Southeast Asia (Van Vuuren and Faber 2009).

There will be an increased demand for meat and dairy products; therefore, there will be a correspondingly increased demand for agricultural products used as fodder. This will increase the demand for protein meal, which - combined with the effect of a slowdown in the demand for biofuels - will lead to an expansion of the areas that produce soybeans (FAO and OECD 2015). In contrast, it is expected that the production of cereals, to be consumed as food, will slow down. At a global level, it is projected that by 2024, more than 320 Mt of additional cereals will be produced, of which coarse grains will represent more than 50% (180 Mt). Production of coarse grain will be centered in developing countries (48%), followed by developed countries (42%), with only a minor portion in least developed countries (10%) (FAO and OECD 2015).

Agricultural processes make inefficient use of resources when compared to industrial processes, thus agricultural-based products (food, fiber, and fuel) are considered to be among the most polluting products. In the case of animal products, it is necessary to use a large proportion of the global production of crops to feed animals, given their metabolism. It is projected that, in 2050, 40-50% of the global production of cereals will be used as animal fodder (Hertwich et al. 2010).

Pressure on land will increase, not only to produce biomass for food, but also for biofuels. Although only a small proportion of all biomass is dedicated to biofuel production, it is nonetheless expected that the demand for resources to produce such crops will be higher than the one for food production. As a result, it is expected that the demand for land and water will continue to increase, thus also increasing environmental impacts (Bringezu et al. 2014).

Looking at the time-period up to 2024, it is projected that trade volumes of most agricultural commodities will increase, with the exception of biofuels, since lower demand is projected from biofuel consuming countries (FAO and OECD 2015).

In the years 2005-2007, there was enough food to feed almost everyone in the world (2,770 kcal/person/day, after accounting for waste, and other uses). However, in reality, although possible, this did not occur. Low agricultural development and limited access to imported food are some of the aspects related to poverty in developing countries, resulting in 2.3 billion people living with under 2,500 kcal/day and 0.5 billion with under 2,000 kcal/day. Meanwhile, about 1.9 billion people in developed countries consume more than 3,000 kcal/day (Alexandratos and Bruinsma 2012). It is projected that total caloric intake will increase by 6% by 2024, which translates into more than 2,000 kcal/day for least developed countries, and nearly 2,800 kcal/day for developing countries; the increase in developed countries is minimal (FAO and OECD 2015).

An analysis of crop productivity, undertaken by Alexandratos and Bruinsma (2012), indicated that the average world yield of cereals has grown on an almost perfect linear trend with increments of 44kg/year, on average. However, this linear growth pattern represents a falling growth trend: 44kg represented 3.1% of the 1960 yield (1.44 tonnes/ha), but only 1.8% of the yields of the early 1980s (2.4 tonnes/ha), dropping to 1.3% of the 2005-2007 average yield (3.4 tonnes/ha). It is projected that cereal yields could grow by between 3.3-4.3 tonnes/ha by 2050, and that other crops will follow similar growth patterns. The study concludes that barriers to increasing yields at the national level need to be overcome, particularly in countries most affected by food poverty (Alexandratos and Bruinsma 2012).

8. FOOD GVCs AND IMPACTS ON FARMERS

Supermarkets and retailers rely on their reach and power to require cost-cutting measures and performance standards of their suppliers (J. Lee et al. 2012).

Small-scale farmers are frequently squeezed out of the chain, because of many factors that reduce their bargaining power. Four factors are predominantly responsible for this. First, trade liberalization, and the elimination of many commodity agreements, opened the door for international firms to sell commodities at lower prices, and reduced the motivation for collective action among small-scale farmers. Second, the geographical dispersion of small farms and poor communication infrastructure was and is responsible for increased transaction costs, as well as the risk of neither delivering goods on time, nor with the requisite quality. Third, smallholders cannot respond fast enough to changes in supply and demand because they lack market information and financial resources to do so. Fourth, payments are often delayed up to sixty days after delivery, which is too long for smallholders to wait because they need a steady cash flow to ensure the sustainability of their farms (Brown and Sander 2007).

Supermarkets, moreover, expect that producers and exporters participate in their promotional offers, which include lowering the on-shelf prices and giving away extra produce for free. In order to be able to do so, producers and exporters must have enough cash flow to endure temporary losses on the expectation of future gains (Brown and Sander 2007).

8.1 Price setting

Lead companies in agrifood GVCs detain power over price setting. Prices can be set not only by lead companies such as supermarkets and manufacturers, but also by key intermediaries such as large traders.

Prices and purchase conditions of sale are set in contract farming agreements (CFAs) usually agreed upon by firms and farmers' associations. Such contracts can be either informal oral agreements, or formal written contracts. On the one hand, written contracts provide higher enforcement options, but they also represent higher initial transaction costs. Written contracts specify prices, delivery times, volumes, quality standards, and resolution procedures if conflicts arise. On the other hand, companies might prefer informal oral agreements when there is already a long and positive relationship with a farmers' organization, or – conversely – when a firm hopes to retain flexibility to nullify an agreement in the case of high uncertainty regarding the ability of the farmer to comply with the required standards.

Some contracts, in addition to the purchase of a commodity, include elements related to added-value, such as provision of inputs to farmers, guaranteed prices to reduce uncertainty relative to price fluctuations, knowledge transfer, and/or support to achieve a certification (i.e., organic, fair-trade) so as to gain price premiums. Participation in CFAs can have positive or negative impacts on smallholders' livelihoods. A farmer can decide to participate in a CFA if he perceives (albeit subjectively) that he will be better off with the conditions offered in the agreement. However, participation in a CFA doesn't necessarily mean that farmers perceive the terms of such agreements as fair, it only means that they expect to be better off by doing so, rather than not (Murphy et al. 2012).

Large commodity traders have tremendous power in setting purchasing prices, especially with farmers with whom they trade directly, but also with grain elevators, to which farmers deliver their grain. This is a result of the high volumes these companies move in international markets (Murphy et al. 2012). According to Murphy et al. (2012) "[Large commodity traders] are so dominant in the bulk commodities sector that – especially in soy and palm oil – they play a central role in the decisions that producers make about what to grow, where, how, in what quantities, and for which markets. They do this by providing inputs and other services directly to farmers, and by securing the sale of those products to traders at harvest. Origination is about sourcing grains directly from the farm. But the strategy is about more than sourcing from the farm. It is also about deciding what the farm should grow" (Murphy et al. 2012).

The market power of large commodity traders has two dimensions: horizontal and vertical power. In the case of agricultural commodities, Murphy et al. (2012) states that horizontal power can be pictured as an hourglass where, on one side, there are thousands/millions of producers and hundreds/thousands of elevators, in the middle a few processors and/or exporters, and on the other side thousands/millions of consumers (depending on the commodity). Vertical power refers to the fact that these companies operate at different parts of the value chain. They buy grain from elevators, process some of it, and then use it in their subsidiaries as fodder for livestock, or as feedstock for biofuels; commodities do not reach the market, and become, instead, an internal operating cost for these large companies. Therefore, vertical integration means that price discovery is limited² (Murphy et al. 2012).

² Price discovery is "the process by which commodity prices are established between buyers and sellers, based on supply and demand, market mechanisms, and risk management" (Murphy et al. 2012)

Large-scale commodity traders are also involved in agricultural and non-agricultural asset management, - financial services, which they also sell to other investors. This is part of a trend known as the "financialization" of both agricultural production and commodity markets, by which financial institutions (i.e., private equity funds, asset managers, pension funds, banks, and others) invest in commodity futures and agricultural land, both seen as alternative assets (Murphy et al. 2012). As a result, higher average commodity prices lead to speculation (i.e., the trading of futures), which, in turn, can contribute to an additional rise in prices (Bringezu et al. 2014).

Increase in food prices have severe effects on the livelihoods of the poor, who usually spend between 70-80% of their income on food. Agricultural price volatility is an issue for farmers who must deal with higher uncertainty that affects their investment and production decisions and, ultimately, their incomes (Bringezu et al. 2014).

Box 1. Distribution of value-added along GVCs

In GVCs there are "intangible", high-value activities, in addition to tangible activities, related to production. These intangible activities (i.e., marketing, brand development, and design) generate more value for lead companies, and are key for their profitability, and power control. Therefore, lead firms retain control over these high-value intangible activities, whereas tangible ones (i.e., production and logistics) have increasingly been outsourced to suppliers, and become commodities. Lead firms, with many potential suppliers, find themselves in a strong position to set contract terms, and to switch suppliers at relatively low cost. As a result, there is an unequal distribution of the total value-added along the chain, with lead firms securing most of it.

About 70% of the total value-added is absorbed by retailers and global traders in the case of the cocoa-chocolate value chain; between 1970 and 2000, the share of value retained by stakeholders upstream declined from 60% to about 28%.

Source: Abdulsamad et al. 2015

8.1.1 Agricultural trade and subsidies Although the liberalization of the international trade of agricultural products was, in theory, meant to increase earnings of rural farmers in developing nations, evidence indicates that, in reality, costs for poor farmers have increased, and that many developing countries are in fact excluded from the international marketplace because they cannot effectively compete (Pérez et al. 2009).

Subsidies and commodity dumping have been issues in the international trade of commodities since the implementation of WTO's Agreement on Agriculture (AoA), established in 1986-94, at the Uruguay Round of trade negotiations. Although agricultural subsidies were, for decades, a form of providing support to farmers and their livelihoods, the AoA was meant to reduce such subsidies in the developed North, so as to establish a fair playing field for developing nations as regards international trade. However, the outcome did not benefit developing nations as expected, because of how the AoA rules on subsidies reduction were established. At the negotiations, the US presented 1986-88 as the baseline period to set for subsidies reduction; however, during this period, support levels were unusually high for developed nations, but not for developing ones. Although the AoA makes some special concession for developing countries (i.e., the replacement of import controls and quotas with tariffs) these mostly benefit large-scale cash-crops exporters and processors. In view of these negotiations, developed nations managed to retain most of their subsidies as they were prior to the AoA (making their farmers more resilient to fluctuation of commodity prices), whereas developing nations were not allowed to increase the level of support to their agricultural sector (Barker 2007).

Technically speaking, the WTO prohibits dumping, however its anti-dumping rules require countries to provide evidence that dumping is actually occurring, which is fairly complicated to generate, especially for developing countries. As a result, livelihoods of smallholders in developing countries are negatively affected (Barker 2007). The problem of dumping is also related to the power of large multinational agribusiness corporations (which include trade, processing, and farm supplies distribution). The control that such companies have over the global supply, and pricing, of many of the world's agricultural commodities leaves farmers (in both developed and developing countries) vulnerable to unfair pricing practices for their crops (Barker 2007).

The WTO's rules require developing countries to open their markets to imports (without allowing for safeguard mechanisms to control the quantities of these imports), while simultaneously restricting countries from providing subsidies to their farmers, but allowing large-scale agribusiness operations to benefit from them. This combination of factors has led to "dumping". According

to Barker (2007), dumping is "the practice of selling a product below the actual costs of production". For example, in 2003, US-based companies exported products below their production cost: wheat at 28%, soybeans at 10%, corn at 10%, cotton at 47%, and rice at 26% their respective production costs (Barker 2007). This led, for instance, to rice farmers in Haiti and Honduras being compelled to reduce their tariffs, under the rules of the WTO and IMF, and thus having to deal with an influx of subsidized rice from the US, - a situation that resulted in the loss of their farm incomes. Another example is the situation of dairy farmers in Jamaica, who cannot compete with subsidized milk powder from Europe. Finally, cotton farmers in many African countries lost twice as much in foregone income, due to the influx of subsidized US cotton, as they received in US foreign aid (Barker 2007).

The use of subsidies to promote agricultural activities can generate negative environmental impacts. For instance, in the Brazilian Amazon, logging and cattle ranching are usually driven by domestic markets. In the case of soybean, its rapid expansion (and the corresponding deforestation) is a response to favorable prices and indirect subsidies from the government in the form of significant public expenditure on transportation (Fearnside 2001). Similarly, in Saudi Arabia, overgrazing and timber extraction are the main activities driving degradation on the rangelands. These activities are the result of subsidies provided to shepherds and herd owners, as well as due to improved transport and access to water points (UNEP 2016f).

8.2 Standard setting

There is an increasing trend among consumers towards quality products that are also environmentally and socially responsible. To respond to such a demand, producers and retailers follow a set of public and private standards that are used to demonstrate (via audits and certifications) that their products in fact provide what consumers demand.

The aim of such standards is to ensure products are manufactured without causing environmental or social harm, and - in some cases - actually generating positive impacts to both (Global Goals for Sustainable Development of the United Nations, specifically Goals 2 (sustainable agriculture and food security), 8 (decent work), and 12 (sustainable consumption and production) (ITC 2015)). Similarly, other standards provide assurance regarding the quality and safety of products.

Despite these positive aims, the interaction between public and private standards often translates into complicated requirements that small-scale producers find difficult to comply with. In addressing these requirements, farmers have three choices. The first option is to upgrade, adopting new farming practices and/or meeting new requirements that grant them access to niche markets (i.e., organic, fair-trade).

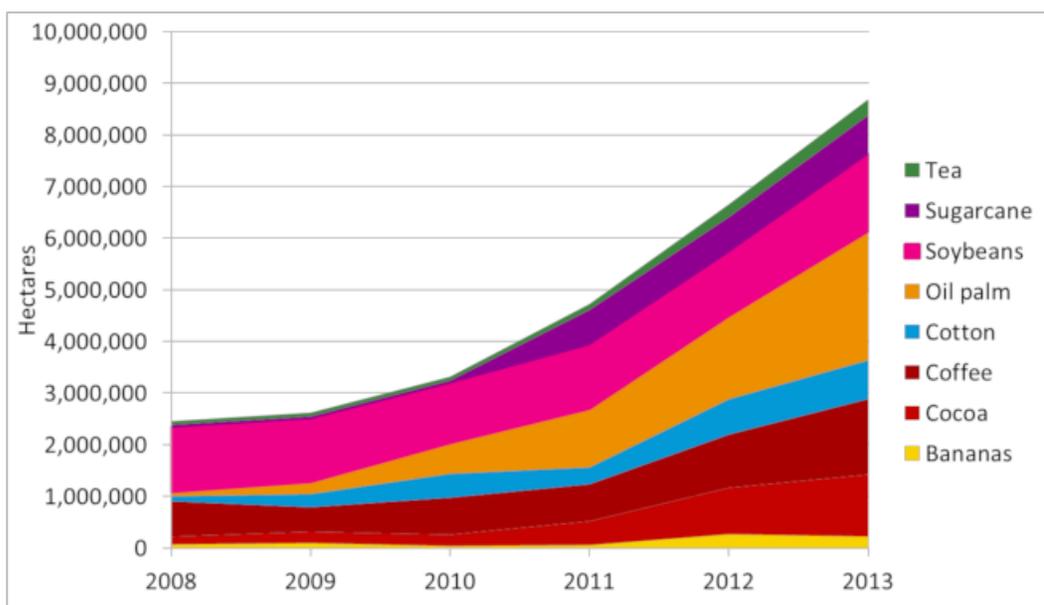
The second option is to downgrade, meaning that farmers face higher costs than their larger peers in order to comply with standards. The third option open to farmers is to exit the value chain, shifting either to domestic markets with laxer regulations, or to chains for other crops with entry barriers they can meet (Lee et al. 2012).

Standards, and the requirements associated with meeting them, vary depending on the type of value chain (producer, or buyer-driven). In producer-driven value chains (led by food manufacturers), the focus is on quality, whereas in buyer-driven chains (led by retailers), the focus is on safety. In producer-driven chains, farmers must abide by the requirements of lead firms regarding biological inputs (i.e., seeds). For example, only a few branded food manufacturers dominate the processed tomatoes chain. These firms dictate, via contracts with out-growers (contract farmers who depend on the market access and resources provided by a lead firm), which variety of seed is to be grown (which, incidentally, can also be a seed which is sold by the company in question, when it is vertically integrated) (Lee et al. 2012).

To gain this competitive advantage it is necessary to maintain close coordination with suppliers. Therefore, it becomes easier for lead firms to work with a group of large-scale producers that can ensure traceability, quality, and lower transaction costs. As a result, small farmers tend to be marginalized.

There are many standards in the market (about 400 consumer-oriented ones), many of which include environmental, social, and economic dimensions. These standards – and their associated certifications – are now part of mainstream markets, and no longer only focus on niche markets (Bito and Petit 2016).

Voluntary sustainability standards (VSS) have grown rapidly. The Roundtable on Sustainable Palm Oil (RSPO), for instance, has increased its certified area almost 30 times between 2008 and 2014. The area under the Rainforest Alliance/Sustainable Agriculture Network (relating to a wide range of commodities) increased 9 times; meanwhile, the area under UTZ Certified (cocoa, coffee, and tea) increased by 6,5 times, between 2010 and 2014. In the case of cotton, the Better Cotton Initiative quadrupled its verified cotton, between 2011 and 2014. Additionally, certified forest area grew by 41%, between 2008 and 2014 (Fig. 7) (ITC 2015).



Sources: FIBL-IISD-ITC survey, 2015; 4C Association, 2014 and 2015; Better Cotton Initiative (BCI), 2014 and 2015; Bonsucro, 2014 and 2015; Cotton Made in Africa (CmiA), 2014 and 2015; Fairtrade International, 2014 and 2015; GLOBALG.A.P., 2015; FIBL, 2015; ProTerra Foundation, 2014 and 2015; Rainforest Alliance/SAN, 2014 and 2015; Roundtable of Sustainable Palm Oil (RSPO), 2014 and 2015; Round Table for Responsible Soy (RTRS), 2014 and 2015; UTZ Certified, 2014 and 2015.

Note: The data in this graph were not adjusted for multiple certifications. The graph assumes that there is maximum amount of multiple certification occurring within each commodity corresponding to the minimum amount of VSS compliant area per commodity. Therefore, the total amount of VSS compliant area corresponds to the VSS with the largest compliant area operating within a given commodity sector.

Figure 7: Evolution of the VSS compliant area worldwide, 2008-2013 (for 8 selected commodities, minimum possible)
Source: ITC 2015.

The significant growth of the volume of commodities certified under VSS gives a clear signal that the market for sustainable commodities is growing fast - at a pace faster than the markets for conventional commodities. There is, nonetheless, already an over-supply of certified products, meaning that companies have a fairly large selection of certified products from which to choose, leading to lower prices for sustainable products (Bitto and Petit 2016).

It should be noted that there is often a misalignment of priorities between global buyers and large intermediaries, when it comes to VSS implementation. Brand firms commit to VSS so as to secure their brand image and reputation. Large intermediaries depend on high-volumes and work with low-margins, thus their focus is to maximize efficiency gains in supply chains. Because intermediaries must comply with their buyer's VSS, but are not willing to absorb the costs they entail, they pass on the financial burden to producers in developing countries, who find themselves constrained to significantly lower their costs, with little power to negotiate any cost-sharing agreement (Abdulsamad et al. 2015).

Box 2: Demand for Non-Genetically Modified Organisms (GMOs) food

There is great awareness, particularly among Millennials, about consuming GMOs. More than 40% of consumers are avoiding GMOs, a movement led by Millennials and by parents with children of 8 years and below.

Globally, organic products were prevalent in 2011 and 2012, but in 2013, GMO-free products represented a larger share of all food products. GMO-free claims rose from 19% to 45%, from 2012 to 2013, and organic claims from 24% to 39% in the same period (Schweizer 2015).

8.3 Investment in the agricultural sector

Traditionally, food production relied on farmers who were directly linked to the land via possession, or ownership. In addition, there were other stakeholders who engaged in trading, processing, distribution, and final commercialization of food products. Nowadays, large players - such as major commodity traders, banks, and other investors - have invested billions of dollars in food commodities. As such, their interest lies, in some cases, only in enhancing productivity and trade, and, in other cases, also in owning or leasing land, and engaging in commodities production. As has been somewhat detailed above, these situations relate to what is known as the financialization of the agricultural sector (Murphy et al. 2012).

Financialization affects the production decisions of smallholders, and their capacity to improve their participation in GVCs. Financialization of production, as relative to the involvement of financial investors as landowners and farm operators in developing countries, results in higher competition for land resources, which generates more negative than positive impacts for smallholders. Similarly, the interactions among large traders and other large players, as well as their influence on governments, and their power to decide "what, when, and how much to sell" affects the markets in which smallholders must operate and compete (Murphy et al. 2012).

Large corporate companies play a critical role in agricultural value chains. For example, in 2005, the ten largest seed corporations controlled 50% of all commercial seed sales (Bringezu et al. 2014); in the case of vegetable seeds (e.g., beans, cucumbers, hot peppers, sweet peppers, tomatoes and onions), one company, Monsanto, controlled 30% of the seed market (Barker 2007); regarding trading, the largest ten trading companies controlled 75% of the market; finally, the largest ten pesticide manufacturers controlled 84% of the pesticides market (Bringezu et al. 2014).

8.4 The issue of land ownership

It is widely understood that land tenure can be improved by converting informal tenure mechanisms to freehold titles, and also by legally recognizing customary tenure agreements. Land ownership is affected by changing settlement patterns, conflict, environmental degradation and climate change, as well as by the growing interest of investors in farmland (Lawry et al. 2014). Insecure and inequitable land tenure exacerbates land conflicts in a reality where many actors must compete for the same scarce land resources (UNEP 2016c). Although tenure formalization is, in general, positively correlated to productivity increases, a review conducted by Lawry et al. (2014) shows that this is not always the case. On the one hand, the provision of title to smallholders in Latin America and Asia resulted in higher investments, productivity gains, and improved farmer incomes. On the other hand, in Africa, gains generated from formalization were very low; this may be because of the lower starting levels of wealth and income of farmers in Africa, as compared to those in Latin America and Asia. Interventions in land tenure can, moreover, generate significant and unpredictable negative social impacts, such as people displacement and reduced property rights for women. (Lawry et al. 2014).

Access to land is a key consideration for large-scale international commodity trading companies. There is no single preferred access model; companies access land by different approaches, such as contract farming, supply agreements with large-scale agricultural producers, land leasing or land ownership for direct production; sub-contracting; or a combination of these (Murphy et al. 2012).

Large-scale private investment in the agricultural sector has been driven by the food crisis of 2007/2008, as well as by increasingly scarce land resources, the economic recession, and the need to meet biofuel targets. Therefore, many of these investments aim at securing food supply or profiting from new green energy markets (Mann and Smaller 2010; Friis and Reenberg 2010). Even so, the latest Agricultural Outlook, from the Food and Agriculture Organization (FAO) and Organization for Economic Cooperation and Development (OECD) (2015), suggests that large-scale private investments on land were a result of high commodity prices, and - given the expected fall in prices - it is expected that investments in land will follow the same trend, in the next ten years (FAO and OECD 2015).

At the other end of the equation, some national governments look at land deals as sources of finance, so as to develop agriculture and infrastructure, and thus actively aim to attract investors (Friis and Reenberg 2010). Meanwhile, countries that depend on food imports usually invest in acquiring and/or leasing land in other countries. For example, Japan has land holdings overseas approximately three times the size of its arable land. An extreme scenario is that of Saudi Arabia, which plans to eliminate its own wheat production by 2016 due to the impacts that the production of this crop has on the water resources of the country. Instead, they will establish an agricultural investment fund to invest in agriculture overseas (Mann and Smaller 2010).

Estimates from 464 projects, between October 2008 and August 2009, indicate that the median size of areas given over to land investment was of 40,000 ha, focusing on food crops (37%), industrial cash crops (21%), and biofuels (21%) (World Bank 2011). The regional focus of land investment was Africa, followed by Asia (Fig. 8).

These types of investment do not prioritize domestic crop production for local, national or international markets; instead, they allocate funds in land and water overseas for the benefit of the investing party (De Schutter 2011; Mann and Smaller 2010). It is important to consider the fact that these investments have a short-term vision that prioritizes profit rather than sustainable land management. In contrast to traditional farmers, who oversee their land, financial investors have no direct relation with the land, given the distant and impersonal manner of the investment transaction, relating to a virtual area from which profits are drawn. Thus, although it might be claimed that industrialized agriculture will benefit local populations, what usually occurs is that the resulting production is then sold in international markets, leading to higher food insecurity and vulnerability of local farmers against volatile food prices (Bringezu et al. 2014).

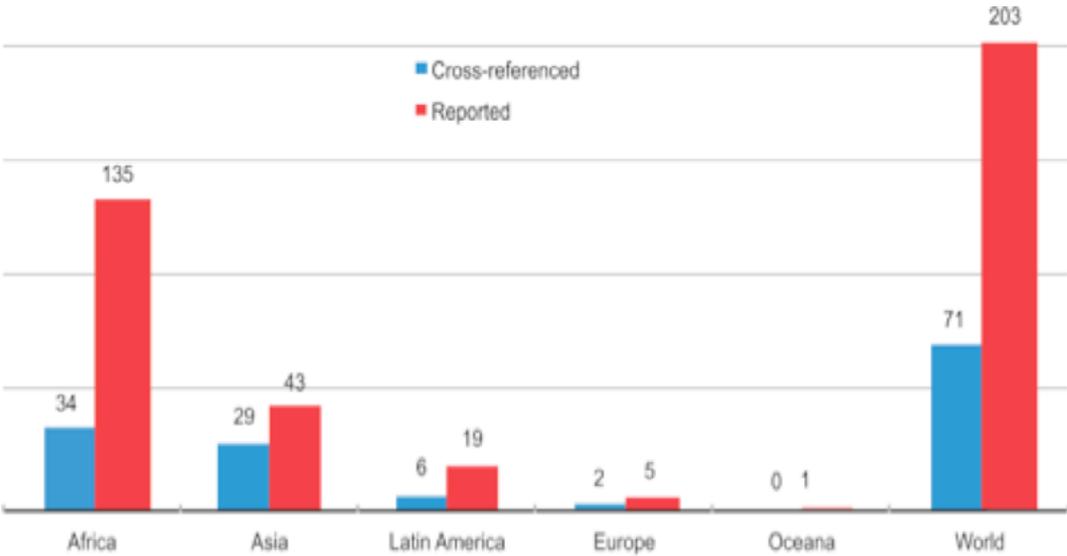


Figure 8: Regional focus of land acquisitions, 2000 – November 2011 (Mha)
 Source: Bringezu et al. 2014

Special attention should be given to the improvement of governance, since a lack of secure land rights at the country level has been linked with higher demand for land from investors (Bringezu et al. 2014). In effect, many land investment deals are identified as “land-grabbing”. Land grabbing is a term used to describe land acquisition that is illegal, fraudulent or unfair (Bringezu et al. 2014). In the 1990s, foreign direct investment in agriculture was about USD 600 million annually, whereas between 2005-2007, it had grown to USD 3 billion per annum, on average (De Schutter 2011). According to the World Bank (2011), “Data from country inventories highlight serious weaknesses in institutional capacity and management of land information... In many countries where demand has recently increased, limited screening of proposals, project approvals without due diligence, rivalries among institutions with overlapping responsibilities, and an air of secrecy all create an environment conducive to weak governance. Official records on land acquisitions are often incomplete, and neglect of social and environmental norms is widespread” (World Bank 2011).

Box 3: Private investment and the development of “mega-farms” in Latin America

In recent years hedge funds and private equity groups have invested in capital-intensive production of selected commodities (i.e., soybeans, corn, and cotton) via a model known as the “mega-farm”. In a way, these investments replicate the role of large traders by behaving as originators and processors of commodities.

One example is the world’s largest farm company, El Tejar (of which the majority shareholders are the London-based hedge fund, Altima Partners, holding 40% of the equity, and the private equity company, Capital Group, holding 13%); this farm cultivates 1 million ha of soybeans, corn, and cotton in Argentina, Brazil and Uruguay, and experienced an expansion of 0.6 million ha, in 2015 alone. El Tejar only owns 20% of the land, leasing the remainder from landowners (who are usually also hired to work the land); all of its machinery, meanwhile, is outsourced so as to reduce fixed costs.

Source: Murphy et al. 2012

Box 4: Displacement of smallholders by soybean mega-farms in Brazil

The fast development of soybean in Brazil resulted in the displacement of eleven traditional agricultural workers for every one newly employed in the soybean production system. This led to significant migration from rural areas mostly to urban areas, but also to frontier areas thanks to the access offered by transport infrastructure projects, thus resulting in increased deforestation. For example, in 1970, 2.5 million people left the rural areas of Paraná, and 300,000, those of Rio Grande do Sul.

Source: Fearnside 2001

Box 5: Costs of soybean expansion in Brazil

The expansion of agricultural commodities has direct and indirect costs. Direct costs refer to the actual money invested in developing the infrastructure required for production. Indirect costs refer to the opportunity costs of lost ecosystem services due to environmental degradation (i.e., deforestation, biodiversity loss, soil degradation, health and ecotoxicity effects due to agrochemical use, and others), as well as negative social impacts (e.g., displacement of subsistence agriculture, opportunity cost of using resources to subsidize crops, instead of investing in education, health systems, and improving employment).

Positive social impacts of this activity are negligible: employment generation is minimal in soybean cultivation. Commonly, only one worker is needed for 167-200 ha of soybean. In addition, the few workers needed are often brought in from different areas, thus not contributing to enhancing local employment at all.

Indirect costs result from the activities directly related to soybean production, as well as those related to additional private investment driven by public expenditure (i.e., logging, ranching, and others). This effect is known as the ‘dragging effect’ that refers to a stimulation of the negative social and environmental effects of activities such as ranching and logging as a result of the development of road infrastructure built for soybeans. Even environmental impact assessment studies have difficulty accounting its impacts.

Source: Fearnside 200

8.5 Land management, land-use, and land-use displacement

Global growth in agriculture is expected to slow to 1.5% p.a. in the next decade, with significant regional differences. Growth in Eastern Europe and the Russian Federation will be 1.3% p.a., while in the Asia Pacific region, it is projected to be at 1.7% p.a.; Africa, Latin America and the Caribbean, meanwhile, are expected to lead global growth in agriculture, at 2.4% and 1.8%, respectively (FAO and OECD 2015).

Growth in the Asia Pacific region is limited by the availability of land resources. Conversely, in Latin America and the Caribbean, higher growth levels are expected as a result of the expansion of agricultural land as well as higher yields. Similarly, in Africa (particularly in Sub-Saharan Africa) it is projected that cropland will expand by more than 10% in the next ten years (with a significant share being used for coarse grains), although without significant improvements in per area yield (FAO and OECD 2015).

Regarding land use, a study from the International Institute for Applied Systems Analysis (IIASA) and the FAO (namely, a global agro-ecological zones study) identified that there are 7.2 billion ha of land with rain-fed production potential at the global level. Discounting the land already under food production, or occupied by forests/protected areas/settlements, or which is unsuitable for rain-fed agriculture,

a potential 1.4 billion ha of prime and good land, suitable for rain-fed agriculture, remain (Fig. 9) (Fischer et al. 2002; Fischer et al. 2011). However, a study by Lambin et al. (2013) indicated that the IIASA/FAO results overestimate the availability of suitable land for rain-fed agriculture when constraints (e.g., socio-economic, biophysical, edaphic, input use, and forest and cropland distribution) and trade-offs (i.e., loss of ecosystem services) are accounted for. In five out of six study regions (namely, Chaco, Cerrado, Congo, Indonesia, and Russia), Lambin's results are significantly lower than those of the IIASA/FAO; the Amazon was the only region that appeared to have much more (168%) suitable land than initially estimated (Lambin et al. 2013).

In today's fast-paced, interconnected, and globalized world, it is not uncommon for land use to be the result of demand in distant places. Rich countries have a high demand for products, both domestic and imported, a fact that is particularly evident when it comes to food production. Rich countries very often depend on foreign lands to satisfy their demand for products – a fact that drives them to occasionally lease and/or purchase land use rights in other countries.

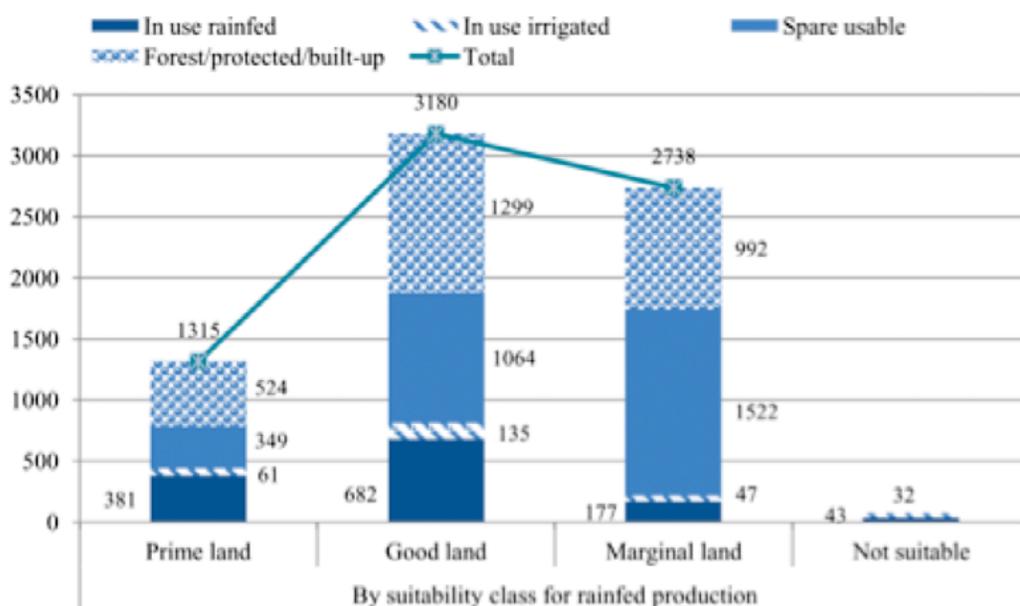


Figure 9: World land availability with potential for rain-fed crops (million ha)
Source: Alexandratos and Bruinsma 2012

This situation not only increases the pressure on scarce land resources, but is also a driver of land displacement, pushing local farmers out, and simultaneously generating environmental pressures, such as deforestation and other land use changes that are not perceived by the final consumer (Yu et al. 2013). Asian and European countries, for instance, are intensively using their available land at nearly its maximum production capacity, and thus depend on imports from other areas with high per capita biomass extraction (i.e., Latin America, North America, and some areas in Sub-Saharan Africa). Such areas have additional room for increased productivity, but the expansion of biomass production has resulted in deforestation, land degradation and losses in ecosystems (Lambin and Meyfroidt 2011; Foley 2005).

A study conducted by Yu et al. (2013) assessed land displacement (measured as the sum of direct and indirect land required for the production of a product outside the boundaries of the importing country); they found that significant amounts of land are displaced as a consequence of international trade. For example, Japan displaces 92% of its land consumption to foreign countries, followed by the EU, at approximately 50%, the US at 33%, and China at 25% (Yu et al. 2013).

9. ALTERNATIVE PRACTICES, WHICH SECURE THE POSITIVE BENEFITS - AND MITIGATE THE COSTS - OF EMERGING COMMERCIAL VALUE CHAINS, ORIGINATING FROM THE LAND USE SECTOR

Besides certifying their products with VSS, many companies have pledged to reach zero deforestation in their supply chains by 2020. This occurred at the New York Declaration on Forests, which was signed by companies, governments, and non-governmental organizations (NGOs), at the UN Climate Summit in September 2014 (Brack et al. 2016). This is in line with the UN Sustainable Development Goal that aims to halt deforestation by 2020 (SDG 15.2).

However, VSS will not be enough to keep consumption at a responsible level in high-consumption regions. It is, therefore, necessary to address food and land use issues from farm to fork (farmers, processors, retailers, and consumers). Equally important is to develop and implement sound public and private policies that generate cost-effective results in the short and medium-term.

Changing trends in the diets of the emerging middle class in developing countries, as well as the already high demand for animal-based food in rich countries call for global changes in consumption patterns. Significant saving in land use can be achieved by lowering consumption of animal-based food (i.e., meat) and by reducing the actual levels of food consumption. Diets based on meat are

more land-intensive because larger areas are required for meat production (feed production and grazing areas), as compared to cereal production, when considering land per caloric value. In other words, producing 1 tonne of beef requires about 3 ha of cropland, and 9 ha of permanent pasture. Actually, substituting the same amount of protein from beef meat with beans reduces life cycle (from production to consumer) greenhouse gas emissions by 99% (Bringezu et al. 2014).

Significant gains in land sparing, and reductions in waste generation, can be achieved by consumer-oriented public and private policy initiatives. Public policies can modify consumers' behavior via the use of financial instruments to incentivize reductions in the consumption of animal-based food. For example, Wirsenius et al. (2010) modeled the potential effects of a consumption tax on animal-based products. The study found that a weighted tax on Greenhouse Gas (GHG) emissions from the production of animal food products in the EU could reduce land use pressures; a tax of 60 euros per tonne of carbon dioxide equivalent (CO₂e) could result in a 15% reduction in the consumption of ruminant meat, and the consequent liberation of 11 Mha of permanent pastures, and 4 Mha of cropland (Wirsenius et al. 2011). Private policies, meanwhile, include options such as supermarkets supporting consumers to choose healthier and more environmentally-friendly foods, via a practice known as choice editing. For example, supermarkets can offer their clients only environmentally and socially-responsible certified products. Another option is to implement simple rating systems (colors or numeric) for products to facilitate consumers' choices in a world of hundreds of standards (Bringezu et al. 2014).

Reducing consumption in developed countries will not only reduce pressure on land resources, it will also reduce the amount of food that goes to waste. For example, without policy interventions, it is expected that food waste in the EU will increase to 126 Mt, in 2020. In the case of developing countries, food waste is generated mostly in post-harvest stages (more than 40% of food losses occur here) rather than during wholesaling, retailing or consumption. Losses are generated as a result of poor road infrastructure, as well as ineffective and/or in-existent refrigeration and storage facilities (coupled, in many cases, with tropical weathers) (Bringezu et al. 2014).

Regarding producers (i.e., small- and medium-scale farmers), an adequate combination of policy and support measures ought to be implemented so as to allow them to overcome the barriers they face with regard to entering GVCs. Such measures should include initiatives at the national level, as well as initiatives tailored to regional and local levels (Brown and Sander 2007).

Policy interventions, which aim to generate a transformative change in local agriculture, must be designed taking into account the particular needs and development stages of agriculture, in the geography under assessment. During an initial stage, in cases where agriculture is extensive, and suffers from low productivity - such as in a low-income country - policy should focus on developing the necessary infrastructure (i.e., roads, irrigation, etc.) and implementing land tenure and ownership reforms, so as to ensure fair and equal access to land. At a subsequent stage, it is necessary to develop policies that create an adequate system by which to produce substantial volumes of products on a reliable basis. This can be achieved by promoting collective actions among farmers, such as via farmers' organizations, and by providing agricultural services (i.e., extension and finance). At a final stage, state interventions are no longer necessary, and can thus cease. At this stage, agricultural production is well-established, farmers have the know-how regarding farming practices and relative to how markets work, and higher transaction volumes for inputs and outputs have been established (Birner and Resnick 2005).

Bringezu et al. (2014) provide a series of public policy options to support small- and medium-scale farmers to overcome barriers to entering GVCs:

- Designing and/or managing economic instruments for sustainability. Although economic instruments, such as subsidies, can generate negative impacts (e.g., dumping and environmental pollution by the indiscriminate use of fertilizers), they can also be positive if they promote a shift towards sustainable practices. For example, shifting from subsidizing fertilizers towards subsidizing sustainable agriculture, such as improved farming practices that ameliorate sustained on-site soil fertility. Malawi, for instance, launched an Agroforestry Food Security System, in 2007, that promotes planting nitrogen-fixing trees; at least 200,000 families participate in the programme. Such instruments should differentiate between "responsible" farmers - those who employ environmentally friendly farming practices - and those farmers that are not efficient in their farming practices. Under such a system, small-scale farmers who use fewer amounts of inorganic inputs (albeit usually because they do not possess the financial resources to do so) could benefit from lower taxes and/or targeted subsidies as a reward for their good farming practices. Although this option does not guarantee positive results in absolutely every case, it should nonetheless be explored as an alternative, on a case-by-case basis. For example, in the EU, at least part of agricultural subsidies are geared towards compliance with environmental performance, in particular those involving agri-environmental criteria. Between 2007 and 2013, such payments represented 20 billion euros (22% of the expenditure allocated for rural development),

and were distributed among farmers who voluntarily committed to preserving the environment and preserving natural landscapes.

- Public investment should adopt a different focus in order to support small-scale farmers in overcoming barriers that prevent them from accessing global food value chains. Public investment should be geared towards public expenditure rather than focused upon the provision of public goods. This way, public expenditure can be used to: facilitate access to markets via improvements in rural infrastructure (i.e., roads, energy, communication systems, etc.), as well as the development of storage facilities (two factors that also can reduce the generation of post-harvest waste generation in developing countries); provide affordable and accessible credit and insurance against weather-related risks; develop education programmes to bridge the knowledge gap on how markets work and on best agronomical practices, in line with international public and private standards, and; support the consolidation of farmers' organizations so as to jointly achieve economy of scale.
- Improving land tenure and ownership is fundamental for long-term environmental conservation, and protection of local communities' rights. Farmers benefitting from secure tenure are far more prone to invest in managing their lands. In the light of the recent trend of large international investments in land acquisition, policies should be put in place to : ensure consultation and participation of local land users, and; include requirements in contracts to provide sufficient benefits to local communities. ensure a strong and enforceable monitoring system is implemented, so as to ensure compliance with such requirements.

If small-scale farmers are given access to market information and receive the support they need, it is not impossible for them to gain some comparative advantage over large-scale farmers. For example, small-scale farmers can employ labor-intensive farming practices that allow for careful attention to be given to some crops; they can also use family labor to reduce costs (although it is worth noting that in some cases this leads to gender inequality and child labor). Sourcing from smallholders can also be considered as part of a sound corporate social responsibility strategy for supermarkets. Additionally, smallholder farming practices can be more attractive than intensive practices from large-scale farmers for those supermarkets wishful of organic products (Brown and Sander 2007).

Public policies should promote better relations between farmers and supermarkets. For example, in 2002, Argentina approved a law requiring buyers to deliver payments to FFV growers within 30 days (rather than 60, which is more commonly used) (Brown and Sander 2007).

Therefore, it is necessary to identify and deploy diverse mechanisms to create synergies that effectively address the challenges that smallholders face in GVCs and to re-direct trade to its original aim of improving global prosperity, but without overlooking negative environmental and social impacts on smallholders in developing nations.

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11. ANNEXES

11.1 Regional perspectives on land use impacts

11.1.1 Africa The African region represents 60% of the unconverted arable land of the world (WWF and AfDB 2015). Land is an extremely valuable resource in the region, and increasing pressure from competing uses leads to a constantly diminishing rate of land availability per person (UNEP 2016a). Land use, and land cover, change are driven mainly by population growth, urbanization, and investments in large-scale commercial agriculture (UNEP 2016a).

The rapid increase in population growth in the region has led to the development of ambitious plans for new infrastructure, planned from now till 2040, at an estimated budget of USD 400 billion (WWF and AfDB 2015). In the next forty years, Africa's population will increase by more than 1.5 billion people, and will represent 27% of the global population. By 2036, it is expected that the growth of urban populations will outpace the growth of rural ones. (UN 2015). Despite the fast urbanization in the region, its rural population still represents 48% of the total population, in 2016; this figure is projected to drop to 44%, by 2050. (UN 2015). The vast majority of those which make up Africa's rural population work in agriculture (UNEP 2016a).

Forest cover decreased throughout North, West, Central, East and Southern Africa between 1990 and 2015, with a net forest reduction of 2.8%, between 2010 and 2015. It is projected that forest cover will be reduced to less than 600 million hectares, by 2050 (FAO 2015c).

Agricultural productivity in the region is low. This is mostly because of the dependence on rainwater, since only 6% of the total cultivated area is irrigated. It is estimated that improvements in irrigation could increase agricultural productivity by as much as 50%. Other factors affecting land productivity include: access to reliable and cheap finance; access to markets; adequate transportation infrastructure; and development of extension services for farmers (UNEP 2016a).

Land fragmentation is considerable in Africa. About 80% of farms (namely, 33 million family farms) are of less than 2 hectares, whereas only 3% of farms are of more than 10 hectares (UNEP 2016a).

Regarding private investment in land, it is estimated that 227,000 square kilometers of arable land in Sub-Saharan Africa have been acquired by large private entities, of which about 90% involve foreign capital (Schoneveld 2014). This represents 9.7% of the total cultivated area in Sub-Saharan Africa, and 35% of the remaining potential available cropland, excluding forests. (Chamberlin et al. 2014). Half of these investments, are located in only six countries (Ethiopia, Ghana, Madagascar, Mozambique, South Sudan and Zambia) (Zerfu Gurara and Birhanu 2012), and focus

mostly on oil seeds (60%), timber and pulpwood trees (15%), sugar crops (13%), and basic food crops (7%) (Schoneveld 2014).

Despite Africa's large potential for the development of renewable energies, only a minor share of its energy matrix is produced from these sources (e.g., only 10% of the region's hydropower capacity is currently used). Fossil fuels thus dominate the region's energy landscape (with proven reserves of 131 billion barrels of oil, 17 trillion cubic meters of natural gas and 120 million tonnes of coal) (UNEP 2016a). However, it is expected that, by 2040, renewables will represent 50% of the total energy supply, also with a component of off-grid generation (i.e., solar, bio-energy, and mini-hydropower) (OECD/IEA 2014).

Box 6: Urbanization and coffee production in Kenya

In Kenya, coffee production dropped by more than 50% because of the expansion of urban areas, which converted plantations into real estate developments. Between 1969 and 2011, population density in Kiambu grew from 194 to 638 people per square kilometer, which translated into more pressure on land, and the transformation of coffee cropland into urban areas. As a result, the remaining coffee farmers had to increase their production intensity in order to maintain their productivity.

Source: UNEP 2016a

11.1.2 Asia Pacific Nearly 40% of the world's agricultural land is in the Asia Pacific region, of which around 31% is arable, 4% is under permanent crops, and 65% is permanent meadows and pastures (FAO 2015b). Income inequality plays an important role in the case of land tenure and land rights (Kanbur et al. 2014), since the rich sectors of society in the region concentrate ownership and access to land (Lawry et al. 2014).

Factors that put significant pressure on land resources are food production and urbanization. The areas suffering the greatest pressures are the protected areas in Southeast Asia (UNEP 2016b). Change in diets is expected to result in significant additional pressures on land, as a growing middle class shifts from cereals to meat, dairy products, fruits and vegetables (ADB 2013). Current production levels have already caused soil erosion, salinization, acidification, compaction, and pollution. So far, agricultural production in the region has limited its expansion of arable land by increasing its production intensity. This was achieved by an increasing use of fertilizers and pesticides, however, it also led to a reduction in the quality of agricultural land (Nkonya et al. 2016).

Nevertheless, given present growth in food demand – a result of population growth, urbanization, and higher incomes – it is expected that the region will face food shortages unless it expands its agricultural areas, or further intensifies its production (UNEP 2016b). Another factor that put significant pressure on land resources is in-country migration from rural to urban areas. It is estimated that, in the region, 120,000 people migrate to cities every day. The expansion of industrial and manufacturing zones also put pressure on forests and fallow lands in the outer zones of cities (UNEP 2016b).

The development of infrastructure – such as roads, railways, pipelines, and irrigation canals – have fragmented the rangelands ecosystems in the region, thus affecting the movement patterns of wildlife and livestock (UNEP 2016b).

Regarding forest land ownership, there is a growing trend towards privately-owned forests. Even when the majority of forest land is publicly-owned, the lowest share of forest land ownership is attributed to indigenous people (FAO 2015c). The transition towards private investment in forest acquisition can have significant repercussions on how forests are managed and protected (UNEP 2016b). For example, there has been significant expansion of palm oil plantations, between 2000 and 2014, mostly in Indonesia, with a 3.7 times increase in area, followed by the Philippines (3.4 times), Thailand (2.9 times), and Malaysia (1.5 times) following the acquisition of forests by private investors (FAO 2015d).

Another significant driver of pressure on forests is the demand for wood products. It is expected that land use change will continue to reduce the average size of forest patches, further increasing ecosystem fragmentation (UNEP 2016b).

Waste generation in the region, which reached 870 million tonnes, in 2014, is driven by rapid population growth, urbanization, and higher middle class incomes. It reached (UNEP 2016b). It was estimated that the per capita generation of waste in the region was of 1.4 kilograms per person per day, in 2014 (a figure expected to rise to 1.6kg/person/day, by 2030). The 2014 amount of waste generation in the Asia Pacific region represented 43% of the global total for the year in question (UNEP and ISWA 2015). The region is also one of the main generators of e-waste because of the presence of China (6 million tonnes), India (2.2 million tonnes), and Japan (1.7 million tonnes); they comprise three of the top five e-waste-generating countries in the world in 2014 (together with the US and Germany) (Baldé et al. 2015).

11.1.3 Latin America Latin America's population is becoming mostly urban; today, it surpasses rural population by a factor of four, and is expected, in 2050, to do so by a factor of six. Land tenure security is an issue in many rural areas of Latin America, and it is one of the regions with the most unequal patterns of land distribution (UN 2015). Land abandonment also occurs in rural areas as a result of urban growth. Although this might seemingly reduce pressures on natural landscapes, it usually results in unplanned urban growth. However, despite the migration of rural population towards urban centers, migrant agriculture and colonization still is a contributing factor to land use change (i.e., via deforestation) (UN 2015).

Regarding ecosystem fragmentation, only 22% of the original Atlantic Forest of Brazil was still standing in 2009, as a result of logging and agricultural operations. In Argentina, grassland cover was reduced by 16% percent, between 1985 and 2004 (UN 2015). Infrastructure development is also a driver of land use change, both by the area occupied by the infrastructure itself, and by the area indirectly affected via the arrival of migrants. As an example, the inter-oceanic highway (running 5,404 kilometers), inaugurated in 2011, that links the Peruvian ports of San Juan de Marcona to Brazilian ports and cities throughout the City of Rio Branco Special Export Zone (ZPE), facilitates the access to – and consequent land use change of – forests and other ecosystems, which are then transformed into agricultural land and pastures for grazing (UN 2015).

The specialization of the region in flexible crops (maize, sugar cane, soybeans, and oil palm) and tropical crops (cocoa, coconuts, mangoes, rubber, bananas, coffee, and oranges) for export led to the expansion of cropland (by 17%, between 2001 and 2013). This additional cropland resulted in land use change of forests and grasslands (UNEP 2016c). In the highland ecosystems, international demand for quinoa (*Chenopodium quinoa*), a pseudocereal recognized as a “superfood”, led to a growth of its cultivated area, from 670 square kilometers, in 2000, to 1,200 km², in 2013. In Bolivia, the price of quinoa has risen significantly, reducing its availability for local populations, and leading to land degradation due to reduced areas available for llamas, the introduction of heavy machinery, and the eradication of native vegetation (UN 2015).

Land grabbing, particularly the large-scale acquisition of lands, has increased as a result of the 2008 rise in prices. Brazil, Uruguay and Argentina are among the 24 most affected countries in the world regarding land grabbing. For example, in the Argentinian and Uruguayan Río de la Plata, the number of farms and ranches diminished by 36%, between 1988 and 2002, as a result of land acquisition (UN 2015).

Mining and oil are also significant drivers of land use change, usually displacing other activities such as agriculture, forestry, and cattle grazing to other areas. In South America alone, 1,680 square kilometers of forest were lost due to mining, between 2001 and 2013. While legal mining projects must follow national regulations regarding landscape restoration, illegal and informal mining moves freely, without any sort of environmental consideration. Illegal mining is an activity with significant environmental and social impacts in the region. For example, alluvial gold mining is responsible for destroying more than 500 square kilometers of Peruvian Amazon in the Madre de Dios region (UN 2015).

11.1.4 North America Land fragmentation is an issue in this area. Land management and development decisions are important factors contributing to this issue. Urbanization is also an important driver of fragmentation because the expansion of urban areas leads to a reduction in cropland. Cities in this region are characterized by being less dense, less compact, and for relying more on automobiles (UNEP 2016d).

Between 1940 and 2000, 28 million housing units were built within 50 km of protected areas, and 940,000 units were built within national forests. A significant part of this growth took place close to wildlands (i.e., forests, grasslands, shrub lands, and wetlands). This is a phenomenon known as the wildland-urban interface (WUI). A study by Radeloff et al. (2010) indicates that, by 2030, another 17 million housing units could be built within 50 km of protected areas. Of these, 1 million would be within 1 km of protected areas. The proximity of buildings to protected areas reduces their conservation value (UNEP 2016d).

The development of urban centers drives the development of peri-urban and suburban areas. The growth of urban centers generates a rise in land prices, driving middle-class homeowners and developers to look for cheaper lands in the peripheries of urban centers. Developing new peripheral areas requires the expansion of infrastructure, however, infrastructure expansion in rural areas generates negative environmental impacts such as ecosystem fragmentation (UNEP 2016d).

In Canada, the rate of land use change - from forest to cropland - is declining. The rate of land use change for 1989-1990 was 2.6%; this decreased to 1.3% in 2004-2005; while for 2009-2010, it was 1%. Forests are also converted into settlements (498,790 ha, between 2010 and 2014). This conversion represents only 0.13% of total forest area, nonetheless, there is a pressure on forest areas (UNEP 2016d).

Box 7: Land fragmentation in the United States

Land ownership patterns in the United States contribute to land fragmentation. 56% of the forest land in the country is privately owned. Over the past 30 years, there has been a trend towards dividing land into smaller parcels, so as to be sold to other private forest landowners. Out of the 10.4 million forest land owners today, 25% have limited experience with forest management, which is reflected by the fact that they have owned their land for less than ten years (moreover, less than 8% of landowners have a management plan). However, recent government policies now require landowners to have a management plan in place to improve sustainable management of forest ecosystems.

Source: UNEP 2016d

11.1.5 Pan-European region In this region, land use change is the result of urban sprawl and land being allocated for cropland and the development of energy projects. Urbanization is the result of higher demand for living spaces and for transport infrastructure driven by population growth, migration from rural to urban areas, and higher incomes. In Western Europe, rural areas are very often swiftly urbanized because of lower prices and better environmental conditions; however, this brings negative impacts for land designated for conservation, and significant losses of agricultural land. Every year in the EU, about 1,000 square kilometers of agricultural or natural land are lost to conversion to artificial areas. Soil sealing - i.e., the covering of soils by buildings - and land take - i.e., the land taken by infrastructure and other facilities - claim 275 hectares of the EU's arable land on a daily basis (UNEP 2016e).

The EU-28 region is a net food importer. About 40% of food consumption comes from imports. This means that a significant part of the land use required for food production to cover local demand must come from other regions, particularly Africa where cropland allocated for local production is approximately 0.6 hectares per person, whereas the area allocated for export products is 1.3 hectares per person. It has been estimated that, in 2007, the EU required 0.31 hectares of cropland per person, which was 25% more than the land per person available in the EU, and beyond the "safe operating space" value of 0.2 hectares for 2030 (Bringezu et al. 2014).

The primary threat for Western Europe's soils is soil sealing (Montanarella et al. 2016). Half of the land taken for settlement and infrastructure development comes from cropland (EEA 2013), which translates into a loss in production capacity of 6.1 million tons of wheat per year (Gardi et al. 2015). In turn, this loss of production capacity may be a trigger for the increase in large-scale land acquisitions, abroad (UNEP 2016e). Other issues include erosion, pollution, compactation, salinization, loss of organic matter and biodiversity, as well as floods and landslides (European Commission 2006). Salinization is a problem that affects extensive areas in the region; it is driven by irrigation systems that are poorly managed. Spain is the country with the largest extension of saline and sodic soils, reaching 3.4 million hectares (Zdruli 2014).

Another common issue for the region is land abandonment (Terres et al. 2013). Land is abandoned because of low productivity, but also because migration and other socio-economic factors. By 2005 52.5 million hectares were abandoned in Central and Eastern Europe and the Balkans, including 32 million hectares in the Russian Federation (Alcantara et al. 2013).

11.1.6 Middle East This region is one of the most affected by land degradation, which is evident by increasing desertification, water scarcity, lower productivity, and overall environmental degradation. Land degradation is the result of higher pressures on land for food, water, and urbanization. These pressures are driven a number of factors, including: the arid and semi-arid weather in the region; climate change; population growth (a 40–50% increase is projected for the next two decades); violent conflicts that lead to displacement and migration; and poor land management (UNEP 2016f). Desertification is a critical issue in the region; more than 40% of the land ranges from severely desertified, to very severely desertified. For example, in the Arabian Peninsula, 89.6% of the land is degraded (AOAD 2014; Abahussain et al. 2002).

Agricultural land represents only 4.8% of the total area, whereas deserts and drylands represent about two thirds of the total area (AOAD 2014). Land degradation, population growth, urbanization, and desertification put significant pressures on food security in a region where all countries depend on imports to cover their food demand (albeit with significant variations among countries, ranging from 5 to 100% food inadequacy) (UNEP 2016f).

Salinization of irrigated agricultural land, especially in the Euphrates basin, has been the result of the destruction of irrigation systems and the displacement of people because of the ongoing conflict in Syria. Other factors driving salinization are poor management of groundwater, in combination with higher surface temperatures and evaporation rates (UNEP 2016f).

Furthermore, a new and growing issue is competition for land for the exploitation of natural gas resources in the Mediterranean Sea.

Box 8: Land degradation

It is estimated that Iraq has the largest area of farmland in the region; however, the country suffers from rapid land degradation. This is a result of poor land management practices, climate change, and water scarcity that have led to soil salinity, an increased rate of soil erosion, and the conversion of wetland to dryland. It is estimated that Iraq loses about 250 square kilometers of arable land each year.

In Jordan, overgrazing led to land degradation and desertification. More than 80% of the country is made up of rangeland, used mostly for grazing and agriculture. Land use conflicts and poor management led to the deterioration of land to a point where it couldn't support grazing as it did before.

Source: UNEP 2016f

GLOBAL LAND OUTLOOK WORKING PAPER



United Nations
Convention to Combat
Desertification