European transnational investments in agricultural land: drivers, dimension and geography

Working paper[*]

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Abstract

Natural resources are likely to become, over the 21st century, the focus of an intensified competition among different uses, the key drivers being the rapidly increasing demand for water, energy, food and minerals related to population growth and urbanisation, as well as changing lifestyles and diets. The availability of any kind of resource has a strict dependence on *land.* This dependence is very high for agriculture and water, and very significant for energy and minerals. Land ownership and use adds layers of complexity in the nexus relating water, energy and food, which are the key pillars of human wellbeing and societal development globally. In global this context, it seems to be important to increase understanding of the converging global dynamics that have spurred a global rush for agricultural land in Africa, Latin America and parts of Southeast Asia, which has intensified after the food price crises in 2007-2008, after many years of little investments in the agricultural sector. This trend is generally referred to as *land grabbing* and is characterised by purchases or long-term leases (which typically run for 50 to 99 years) of farming land by either private or public investors.

The purpose of this study is to increase understanding on the role that the European Union member States play, both collectively and individually, in the current wave of acquisitions in agricultural land. This study, first, provides a comprehensive overview of the phenomenon at the global level and in the EU, by analysing the scope of land acquisitions and the profile of investors. Secondly, policy-driven actors are distinguished from resource-seeking investors. The main targeted countries are also identified as well as the potential impacts of land acquisitions given the level of development of these countries and their natural resource endowments. The purposes of EU investments are unravelled and linked to EU investments in land.

Key Words:
Land and water acquisitions
Water-food-energy nexus
EU food and energy policy

Introduction

Human wellbeing and societal development depend on the availability and management of water resources and land. The key drivers of the rapidly increasing demand for water and agricultural lands are not only population growth associated with changing lifestyles and diets, but also increasing energy needs: thus water and agricultural land become global resources, contended not between local communities but between multinational companies and countries. Over the next few decades, water and land as global resources are thus likely to become the focus of an intensified competition among different sectors. The purpose of this paper is to investigate, in this global context, the recent wave of investors' interest in land, which has increasingly been the focus of public attention and a source of concern for NGOs, international institutions, academia and civil society since 2007. The international community has labelled this phenomenon as *land grabbing*, a term that not only emphasises the appropriation of resources by investors but also imply a critique of their potential impacts on livelihoods and ecosystems in the target countries.

More specifically, the purpose of this study is to investigate the role that the European Union member States play, both collectively and individually, in this wave of acquisitions in agricultural land. European countries are among the main actors involved in land acquisitions, mainly for agricultural purposes (both the production of food and agro-fuels), but also for forestry uses and the production of renewable energy. European countries, especially in East Europe, are also involved in large-scale land acquisitions as target countries. The present study, first, seeks to analyse the scope of land acquisitions pursued by the European member states; secondly, to understand the relationship between the EU agricultural and energy policy and the rush for foreign land. Finally, the study discusses the implications and the potential risks and benefits brought about by land deals, both in terms of water resources and land. The study is original in that it not only provides an overview of the currently under-investigated EU investments in farming land all over the world, but also sheds light on the main drivers of EU land transactions both in terms of agricultural and energy policies, as well as availability of water and land resources. Understanding the real scope, pace and nature of the phenomenon is still a challenge due to the controversy and the lack of transparency associated with the currently available data.

The study is structured as follows. The first section aims to outline on the global water and land-related challenges the world is now facing and to provide a background on the global phenomenon of land acquisitions. The role that water resources play in driving land transactions is also highlighted. The main drivers of the global wave of

investments are identified and the concerns the phenomenon has generated addressed. The second section provides details about the data sources and methods deployed in this study. The limitation and challenges associated with data on land acquisitions will also be discussed. The third section presents the main findings of the study. Global land acquisitions are addressed both at the global level and with a focus on the EU. The aim is not only to explore the scope of the phenomenon but also to understand the main intentions of the leading EU-investor countries .The fourth section addresses the EU agricultural and energy policy with the aim of understanding the relationship between policy imperatives and the interest of EU private investors and governments in foreign farming land, as well as the main drivers and potential impacts of the phenomenon in terms of land and water resources availability in relation to both EU investor countries and most targeted countries by EU investors. The study concludes with a discussion on the main findings and limitation of this analysis.

1. Background

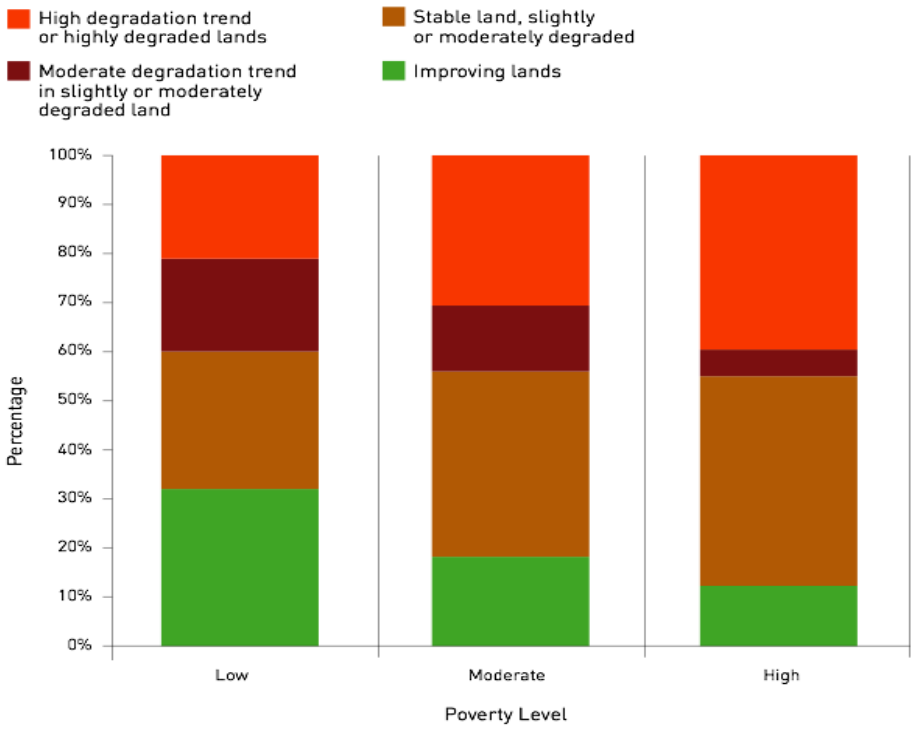
The purpose of this section is to present the global context of this research and to discuss the main concerns of this study. First, the global challenges the world is now facing *vis-à-vis* the food and energy requirements of a growing world population are outlined. Secondly, this section analyses the global rush for agricultural land and discusses its main drivers and potential implications. Thirdly, the role that water resources plays in underpinning any investment in land is unravelled.

1.1 Water resources and land

Land and water systems, which underpin global food producing systems, are currently under major stress. Agriculture uses 11% of the land surface (FAO 2011) and consumes, on a global average, 70% of the freshwater withdrawn from aquifers, streams, and lakes (FAO 2013). About 25% of the world's total land is highly degraded, 8% is moderately degraded and 36% is slowly degraded. Poverty and land degradation are correlated, as shown by Figure 1 (FAO 2011). It has been estimated that, an additional 47 million ha will be needed for food and animal feed production, 42-48 million ha for large-scale afforestation, and 18-44 million ha for producing biofuel feedstock by the year 2030 (European Report on Development 2012). However the amount of suitable land to bring under cultivation is quite limited, with the exception of large tracts of land in sub-Saharan Africa and Latin America and, to a lesser extent, East

Asia. Water scarcity and land degradation are thus among the biggest challenges the world is now facing.

Figure 1. Land degradation and poverty



Source: FAO (2011: 20)

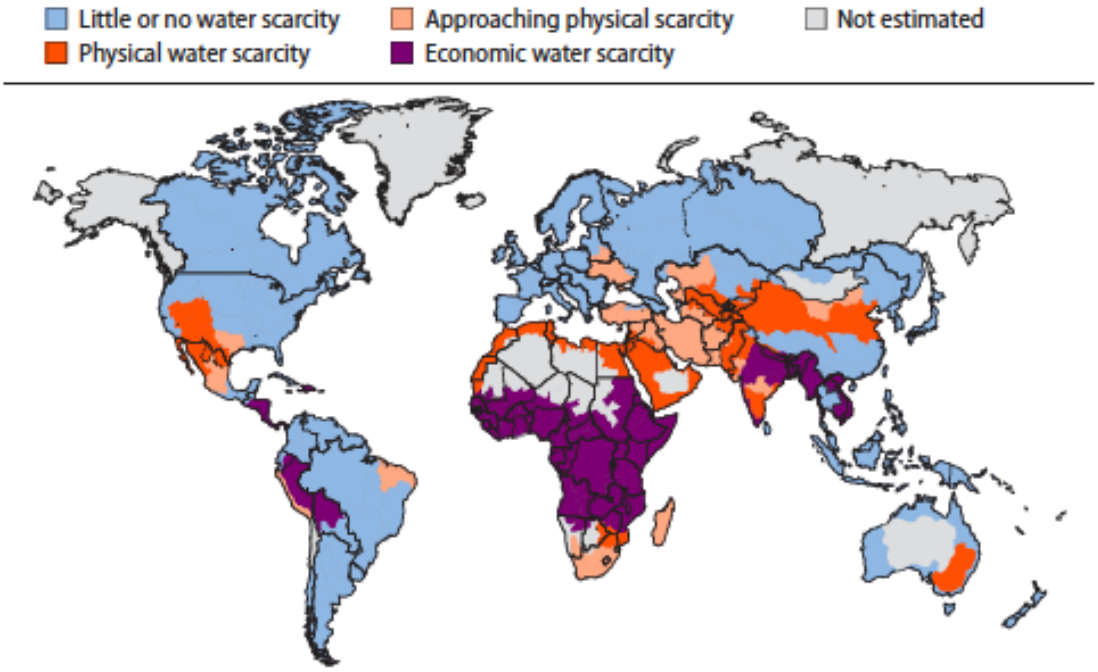
Water resources are also already under major stress, both in terms of quality and quantity. Water demand for the agricultural sector is projected to increase at least by 20% by 2050, even in the presence of productivity improvements through technological development (De Fraiture *et al.* 2007). The sectors competing for water resource not only are industry, agriculture and domestic use, but also ecosystems and ecosystem services. It has been showed that environmental flow requirements for "fair" ecological conditions represent between 25 to 46% of mean annual flow globally (Pastor *et al.* 2013).

Some authors (Falkenmark 1989) have calculated the amount of water necessary to meet the overall needs of an individual setting at 1700 m^3 per capita per year a threshold for water security and 1000 m^3 for scarcity, other authors have pointed out that scarcity is a relative concept. Four types of water scarcity have been identified (Molden 2007; Figure 2)[4]:

[4] This definition is consistent with that developed by FAO (2008), which defines water scarcity as "as a gap between available supply and expressed demand of freshwater in a specified domain, under

- ***Little or no water scarcity*** - Water resources are abundant relative to use. Less than 25% of water from rivers is withdrawn for human purposes.
- ***Physical water scarcity*** - More than 75% of river flows are withdrawn for agriculture, industry, and domestic purposes (accounting for recycling of return flows). This definition relates water availability to water demand, and therefore implies that dry areas are *not* necessarily water scarce.
- ***Approaching physical water scarcity*** - More than 60% of river flows are withdrawn. These basins will experience physical water scarcity in the near future.
- ***Economic water scarcity*** - Human, institutional, and financial capital limit access to water even though water in nature is available locally to meet human demands. Water resources are abundant relative to water use, with less than 25% of water from rivers withdrawn for human purposes, but malnutrition exists.

Figure 2. Current physical and economic water scarcity



Source: Molden (2007: 63)

prevailing institutional arrangements (including both resource 'pricing' and retail charging arrangements) and infrastructural conditions" (2008: 5). The Millennium Development Goals water indicator should also be acknowledged. It measures "the level of human pressure on water resources based on the ratio between total water withdrawal by agriculture, cities and industries over total renewable water resources" (*ibidem*).

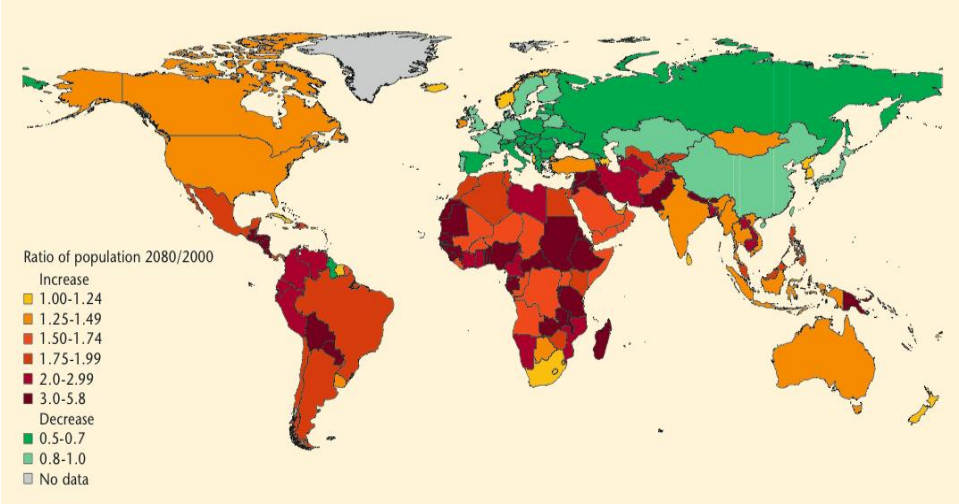
As global scarcity of natural resource accelerate, "resource endowments are increasingly likely to affect trade and investment patterns and hence the potential for economic growth for those countries that have abundant natural resources" (European Report on Development: 107).

1.2 The new competition for land and water resources

Water and land as global resources are likely to become, over the 21st century, the focus of an intensified competition among different uses. Several factors have been identified as main drivers of the increased competition for the use of water resource and land (Pretty 2008; Evans 2009; Royal Society 2009). First, the *growth of the world's population*, which is expected to soar from 6.5 billion in 2005 to 9.6 billion by the year 2050 and 10.9 billion in 2100[5] (UNDESA 2013), which will drive an increase in the demand for food, coupled with rising incomes and urbanisation. More specifically, rising populations and higher incomes are expected to call for 50% more food in 2030 and 70% in 2050 (Bruinsma 2009). In developing countries, the increase will reach up to 100% by 2050, relative to 2009 levels (FAO 2011). In these areas, population growth will be very intense (Figure 3) and often combined with malnutrition (Figure 4). As the world's remaining cultivable land lies in developing countries and is managed by smallholder communities that achieve very low yields, investing in the agricultural sector has been recognised as crucial for ensuring future demands for food. The required increase in average net investments ranges between 83 and 209 billion US$ per year (FAO 2009).

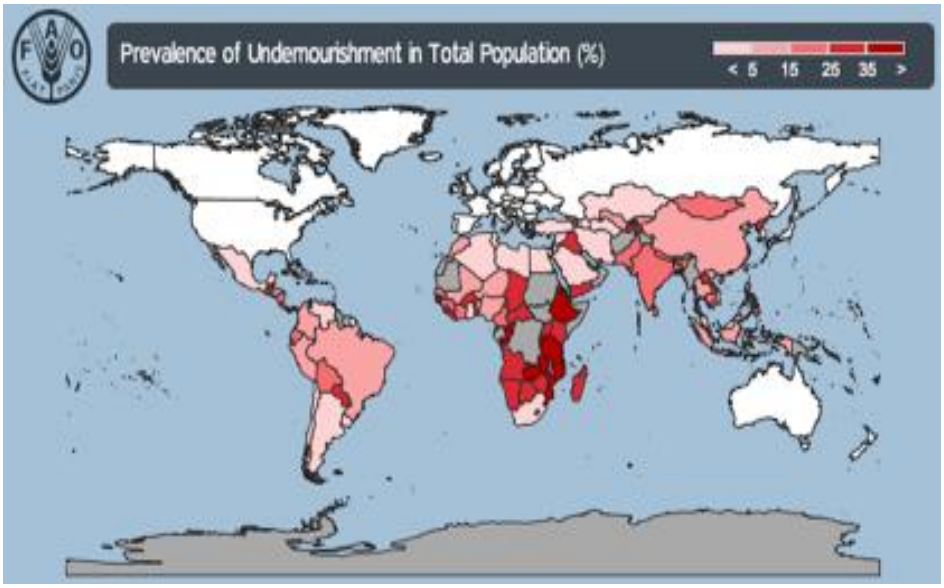
[5] These estimates are based on the medium-variant projection developed by the United Nations Department of Economic and Social Affairs, which assumes a "decline of fertility for countries where large families are still prevalent as well as a slight increase of fertility in several countries with fewer than two children per woman on average" (2013: xv).

Figure 3. Global population growth and decline by country (2000-2080)



Source: WWAP (2009: 30)

Figure 4. Global hunger map (2010-2012)



Source: FAOSTAT (2013)

The impacts on land and water resources are also likely to be exacerbated by the *increasing demands for high-value animal protein*, which are positively correlated to the level of income of a country. About 26% of the world's land area is used for grazing livestock and 21% of arable land is used for producing cereals for feeding animals (Steinfeld *et al.*1997). According to the World Health Organisation (2013), annual meat production is projected to increase from 218 million tonnes in 1997-1999 to 376 million tonnes by 2030; annual meat consumption is projected to increase from 36.4 kg per capita per year in 1997-1999 to 45.3 kg per capita per year in 2030. In developing

countries, the demand for animal products is predicted to grow much faster than production. In these countries, trade deficit is thus expected to rise. The impacts of increased livestock production over the coming decades will be significant both in terms of land and water resources, as the production of meat requires large amounts of feed grains which in turn require vast amounts of land and water to be grown.

Box 1. Agricultural productivity

Agriculture represented society's major economic sector until the 19th century when, during the Industrial Revolution, its relative share of economic activity started declining. This decline was "uniform and pervasive, whether in socialist or capitalist countries" (Timmer 1988: 276). The development of the agricultural sector, however, generally precedes or accompanies (industrial) economic growth in market-based economies. During the Industrial revolution, for instance, Britain's agrarian transformation (enclosure of open fields, increase in farm size, revolution in land tenure and emergence of large-scale farming) played a key role not only in increasing output but also supplying labour and capital to the industrial economy (Allen 1994). In developing countries, a strong correlation between the agricultural output and the growth of the economy as a whole has been recognised (references).

The need to meet the requirements of increasing populations has driven improvements in agricultural productivity so to avert "Malthusian crisis" (i.e., a situation in which the requirements of the population outstrip the capacity to supply food). Over the past half century in fact, population doubled, food supply tripled, while the land under cultivation increased, at the global level, only by 12% (Fuglie and Wang 2012). This is to say that the expansion of food supply was mainly achieved by improving agricultural productivity rather than by increasing total cultivated land. Since the mid-1980s, however, the agricultural growth rate has started declining, whereas the global demand for staples (such as, wheat, maize and rice) and meat has soared (Evans 2009; Godfray *et al.* 2010). The past decades were also characterised by a downward trend in food prices (-1% per year on average), which inverted at the very beginning of the 21th century (around 2001), when real food prices started rising (Fuglie and Wang 2012).

The decline in agricultural productivity – together with other factors, such as the reduction in global stocks of grains, speculative trading and the erection of trade barriers – is considered to be one of the main factors responsible for the 2007-2008 price spikes of food commodities (DEFRA 2008; 2009). The challenge of the 21st century is thus how to increase productivity in agriculture to meet the future requirements of the world's population, while the agriculture's productivity gains of the Green Revolution continue to diminish (Harvey and Pilgrim 2011). An increase in investments in research and development seems to be necessary in pursuit of these goals.

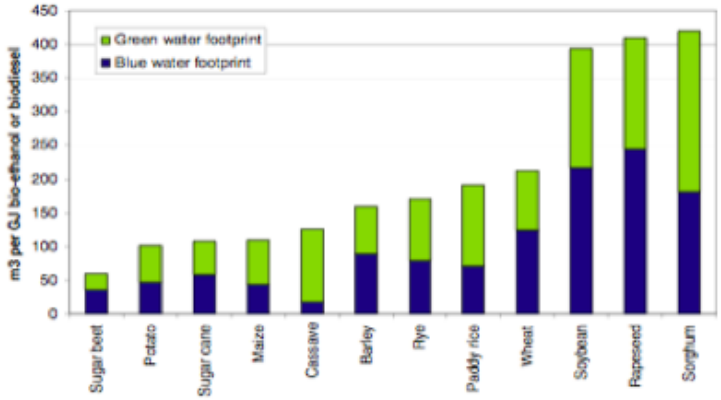
A number of studies have demonstrated that animal products are highly water-intensive[6] (De Fraiture *et al.* 2007; Liu and Savenije 2008; Mekonnen and Hoekstra 2012). Over 15,000 liters of water are 'embedded', on a global average, in a kilo of beef (Mekonnen and Hoekstra 2010). The land requirements for meat production are also high, although they differ between animal species (Elferink and Nonhebel 2007). Livestock production is also responsible for land degradation in many parts of the world, especially due to overgrazing and deforestation because of ranching (Steinfeld *et al.* 1997). The increase in livestock consumption will require more cereal grain to be diverted from human consumption to animal feed. At present, more than one-third of global cereal production is used either for animal feed or industrial use – including biofuel (Locke *et al.* 2013). In developed countries, the proportion reaches up to two thirds of total cereal production (Erb *et al.* 2012).

A major driver for increasing competition for land and water resources is *energy*. Water and land are in fact major input factors for energy production. By 2035, global energy demand will grow by one-third with respect to 2011, especially in the world's emerging economies (China and India, but also countries in the Middle East and South East Asia) that will account for more than 90% of total net energy demand (IEA 2013). Energy demands from hydropower and other sources is projected to increase by an overall 60% by the year 2030 with respect to 2004, thus generating further pressure on water resources (WWAP 2009). Moreover, the production of feedstock for biofuels destined to the transport sector competes with food production not only on significant tracts of prime cultivated land, but also because growing biomass requires large volumes of water. The production of biofuel feedstocks currently occupies some 2-3% of the world's arable land (FAO 2013). Moreover, the water 'footprint'[7] (WF) of biofuels is large compared to other forms of energy. As showed by Gerbens-Leenes *et al.* (2012), the global water footprint of biofuels will grow by more than ten times by 2030 compared with the 2005 levels, and exacerbate freshwater scarcity in many countries. In general, the WF of bioethanol is smaller than that of biodiesel. The WF of bioenergy shows large variation, depending on three factors: (i) the crop used (as showed by Figure 5, rapeseed, soybean, and sorghum are the most-water intensive agrofuels); (ii) the climate at the location of production; and (iii) the agricultural practice (Gerbens-Leenes *et al.* 2009). The increase in Europe as a whole will be very high both for bio-ethanol and bio-diesel consumption (Figure 6). A number of EU countries will also be among the top bio-diesel and bio-ethanol consumers in the world (France, Italy, Germany, and the UK).

[6] It is noteworthy to say, however, that animal products from *grazing* (rainfed-sourced) systems have far lower impacts on water resources (Antonelli and Greco 2013).

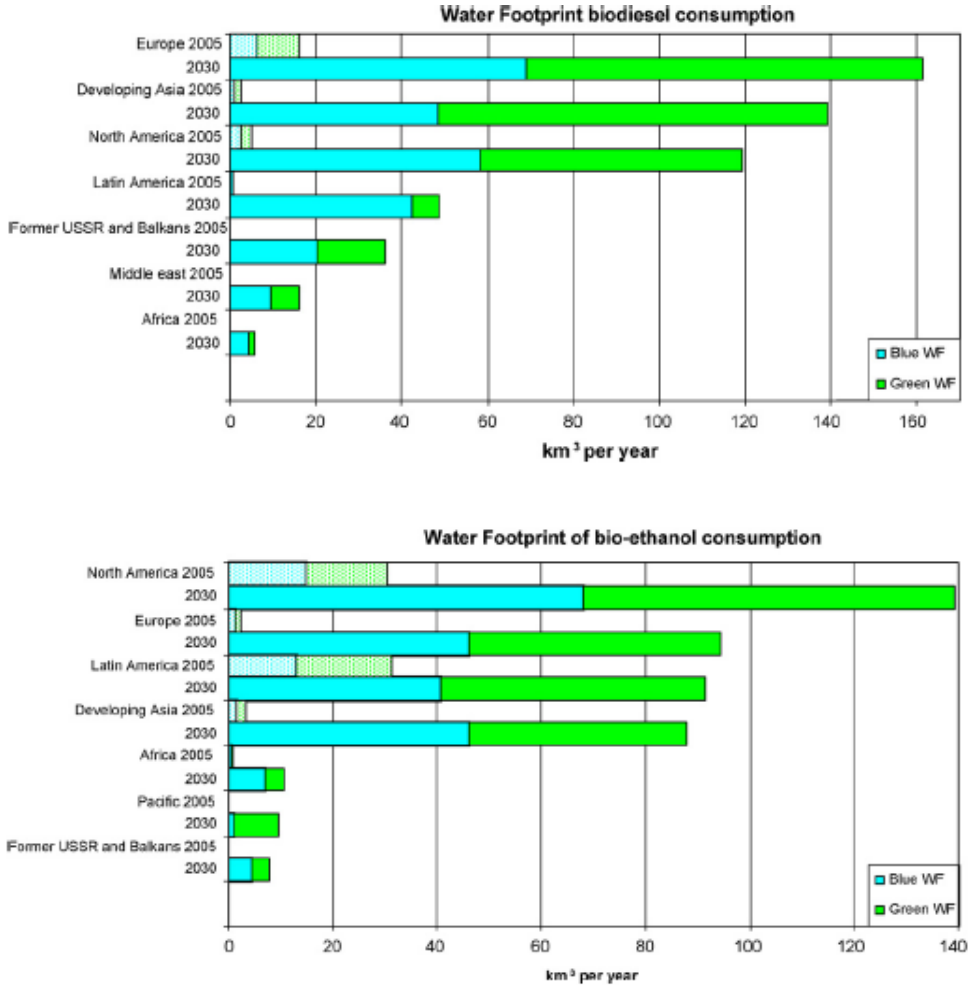
[7] The *water footprint* is an indicator of freshwater use, defined as the total volume of freshwater used to produce goods and services. Water use is measured in terms of water volumes consumed (evaporated or incorporated into a product) and/or polluted per unit of time (Hoekstra *et al.* 2011).

Figure 5. The weighted global average water footprint for 10 crops providing ethanol and for 2 crops providing oil for biodiesel



Source: Gerbens-Leenes et al. (2009: 3)

Figure 6. Water footprint of biofuel consumption (2005-2030)



Source: Gerbens-Leenes et al. (2012: 769)

Finally, another driver for an increased competition for land and water resources is *climate change*, which is expected to modify precipitation patterns, evapotranspiration and temperature, while increasing the number and severity of extreme events (Bates *et al.* 2008). These changes will affect livelihoods and the agricultural sector especially in the developing world, where populations are far more dependent on farming and highly vulnerable to climate change due to the lack of social, technological and financial adaptation measures (UNFCCC 2007).

To sum up, this section has outlined the main land and water-related challenges the world is now facing *vis-à-vis* a number of driving forces that will exacerbate the competition between these two resources in the coming decades. This changing context calls for the shift towards a new pattern of growth that is both *inclusive* and *sustainable* (European Report on Development 2012). It should also be noticed that the increased competition over land and water resources could become a potential source of controversy between national, regional and global interests (Harvey and Pilgrim 2011). In this context, the following section will provide a background on the recent "land grabbing" phenomenon, that is, the growing interest in the acquisition or long-term lease or direct acquisition of vast tracts of land, mostly in developing countries, by private investors and governments. The involvement of the EU in the global 'land rush' will be explored in detail in Section 3.

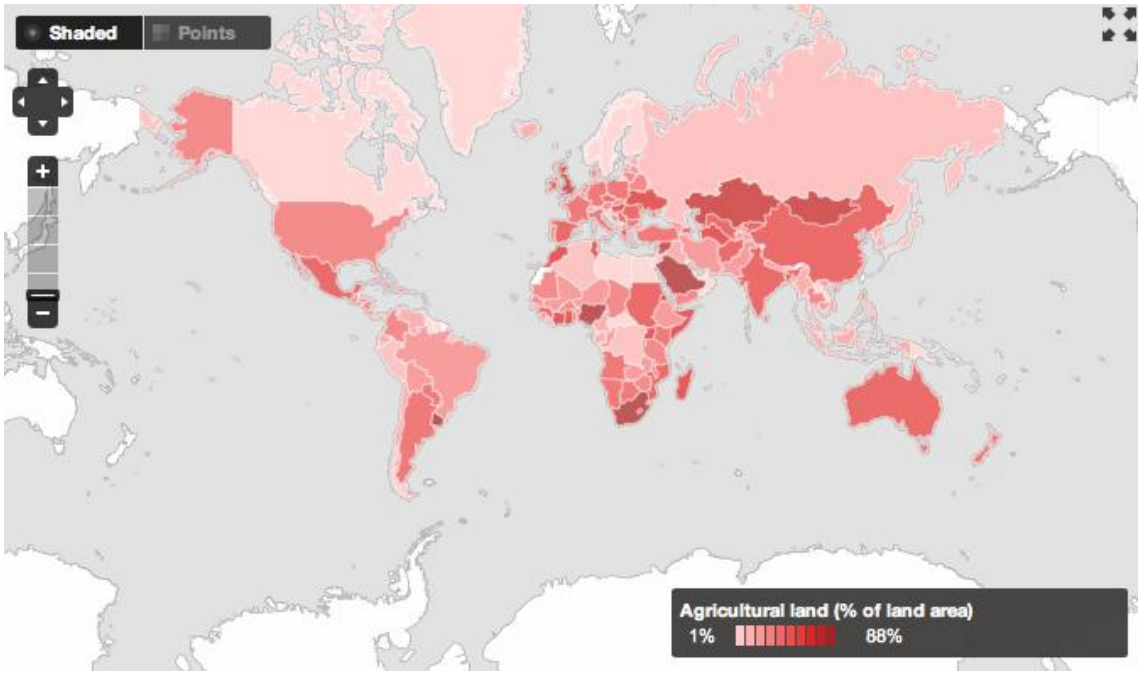
1.3 The rush for agricultural land

The second half of the initial decade of the century has witnessed an increased interest in land for agricultural use, especially in developing countries – especially Africa, Latin America and parts of Southeast Asia – due to the "perception" of vast tracts of land available, cheap labour and land, favourable climate for agricultural production, proximity to markets where products can be exported, and availability of water resources to be used to irrigate at relatively low costs (De Schutter 2009). This phenomenon has often been referred to as *land grabbing* and involves governments and private investors from both industrialised countries and emerging economies securing large tracts of farming land (over 1,000 ha) in marginalised rural areas by means of long-term lease, which typically run from 55 to 99 years, or purchase agreements. Two categories of investments have been spotted. First, the investments aimed at natural resources for agricultural or ecosystem purposes. These types of investments are generally aimed at the first phase of the supply chain, i.e. primary production. The second category of investments is characterised by actors controlling the different phases of the value chain through vertical integration (i.e. "the ownership of the production or the ownership of a production unit that previously had purchased the

output") and direct investments (Anseeuw and Ducastel 2013: 40).

In 2012, the agricultural land deals reported were 1217. They amounted to over 80 million ha of land equivalent to 1.7% of the world's agricultural area (Anseeuw *et al.* 2012). It is noteworthy that, as showed by Figure 7, in the developing world the agricultural land is only a small percentage of total land area. There is, however, a large gap between plans and actual implementation, as land agreements are often not followed up by productive activities. Deininger *et al.* (2011) reported that many of the announced investments have not materialised and that, of those that have materialised, only 20% have started actual farming.

Figure 7. Agricultural land as a percentage of land area (2009-2013)[8]



Source: World Bank (2013)

While farmland acquisitions have always occurred, the scale and orientation of the current wave of investments have brought this phenomenon to worldwide attention since the second half of the 2000s. It has been argued that the drivers of the current

[8] Agricultural land refers to the "share of land area that is arable, under permanent crops, and under permanent pastures. Arable land includes land defined by the FAO as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow. Land abandoned as a result of shifting cultivation is excluded. Land under permanent crops is land cultivated with crops that occupy the land for long periods and need not be replanted after each harvest, such as cocoa, coffee, and rubber. This category includes land under flowering shrubs, fruit trees, nut trees, and vines, but excludes land under trees grown for wood or timber. Permanent pasture is land used for five or more years for forage, including natural and cultivated crops" (World Bank online database 2014).

wave seems to be closely tied to major shifts in power and production characterising the new global political economy (Margulis *et al.* 2013). The drivers of global land transactions are mainly four. First, the need to secure reliable food supplies in the long-term, especially for land and/or water-scarce countries (Rulli *et al.* 2012; Allan *et al.* 2013). This is the case, for instance, of the arid and semi-arid food-deficit oil-rich economies of the Middle East (Jägerskog *et al.* 2012). Secondly, the increasing demand for agrofuels, especially in Europe and the US, supported by subsidies and incentives. Agrofuel production is pursued in the vast majority of the acquired land for agricultural purposes, especially in Sub-Saharan Africa (Giovannetti and Ticci 2013)[9]. Thirdly, speculation on future increases in the price of agricultural land (De Schutter 2009). Finally, land transactions accelerated since 2007-2008, especially as a consequence of the ban to exports and the increase in export levies set up by many food-exporting economies. A detailed discussion of the relationship between land acquisitions and the 2007-2008 price surge in food commodities will be the focus of the next sub-section.

The countries of investment origin can be categorized in three groups: emerging countries (such as Brazil, South Africa, China, India, Malaysia and Korea); Gulf States; and countries in the Global North, such as the US and European countries. Data reveals a tendency in investment concentration in low-income countries, with a high incidence of hunger and weak land institutions (FAO 2012). Reported land agreements involve four different types of investors – namely, private companies, state-owned companies, investment funds and public-private partnerships. The majority of reported land agreements are concentrated in a few countries – namely, Sudan, Ethiopia, Mozambique, Tanzania, Madagascar, Zambia and DR Congo in Africa; and the Philippines, Indonesia and Laos in South-East Asia (Anseeuw *et al.* 2012). Land deals also occur *within* regions. Intra-regional investments are common in Asia and South America (FAO 2012), but South-South land deals are also increasing (Cuffaro *et al.* 2013). European countries have emerged as both investors and target countries. It has been reported that the EU is using about one third of its own arable area outside its own territory as a result of virtual land 'imports'[10], which totalled almost 35 million hectares in 2007/2008 (Von Witzke and Noleppa 2010). The nature and scope of the EU involvement in the global land rush will be the focus of the analysis developed n the following sections.

[9] The EU energy policy will be the focus of Section 2.

[10] Virtual land 'imports'/'exports' are obtained by translating the quantities of agricultural commodities and processed products which are traded internationally into arable land requirements (or any other resource) for exported and imported goods (Von Witzke and Noleppa 2010).

The legitimacy of foreign land deals is one of the most controversial issues debated by the scientific community worldwide (IFAD 2011). It has been argued that, in countries characterised by weak land governance and high corruption, politicians often grant concessions to investors by means of bribes and eviction from land of local subsistence farmers, often without adequate compensation (Vermeulen and Cotula 2010). For instance, American and European companies have set up similar arrangements in food-deficit countries, such as Ethiopia, Mozambique and Tanzania, and switched land use from growing crops for food to biofuels (FAO 2009). Most of land transactions are in pursuit of agricultural production, either for food or bioenergy. It has been estimated that the share of biofuel production is almost three times larger than the share of food production[11] (Anseeuw *et al.* 2012).

The interest in *land grabbing* and its implications has grown substantially over the past few years and stimulated an intense debate at the international level between the scientific community, international organisations and civil society movements. While some expert have raised concern about the potential adverse impacts of the increase in large-scale land acquisitions in poor and vulnerable countries, both in social and environmental terms (Cotula *et al.* 2009; Deininger 2011; De Schutter 2011); others point to the potential benefits that could arise from such investments, not only by providing new sources of livelihoods in the target countries, but also for securing the food needs of a growing world's population (German Federal Ministry for Economic Cooperation and Development 2009; World Bank 2011). These concerns about the risks associated with large-scale foreign acquisitions of agricultural land, especially in poor countries are mainly related to, first, the capacity to secure domestic food supplies in the targeted countries after the agreement (Matondi *et al.* 2011); secondly, the exclusion of local populations with customary access to land from the new agricultural development projects (Deininger 2011); thirdly, the questioning of land and water rights (Jägerskog *et al.* 2012).

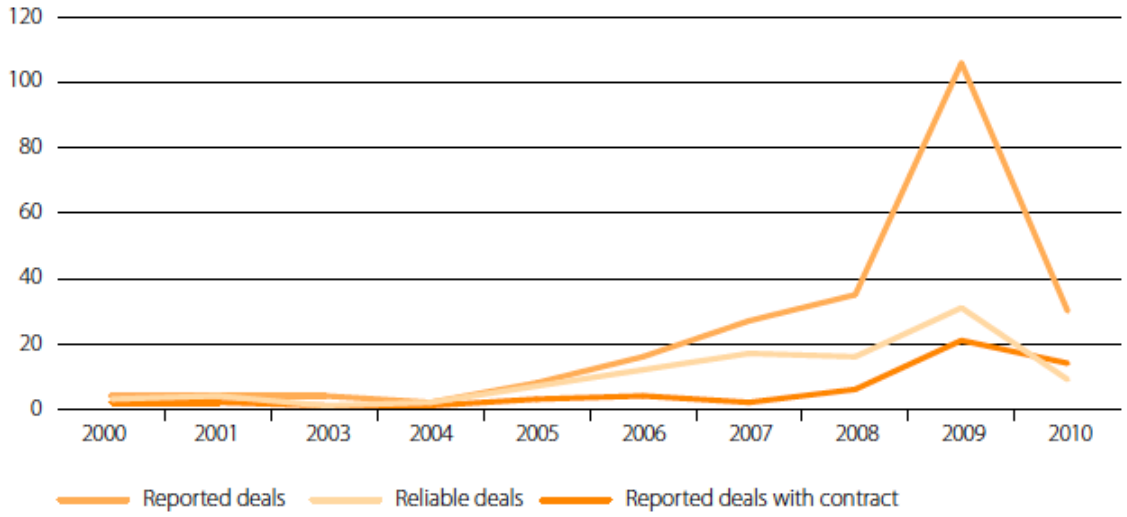
The real extent and the nature of this new phenomenon, however, are difficult to assess both because of the lack of reliable data, and the lack of transparency of the acquisitions processes and contractual agreements. Moreover, with little empirical data, it is difficult to understand how to minimize the risks associated with these investments in farming land while capitalising on any opportunity potentially arising for the targeted countries. Data on both domestic and international land deals around the world have been collected mainly by GRAIN and the International Land Coalition (ILC), which, in partnership with other research centres, releases the dataset Land Matrix, which is the main source of data deployed in this study.

[11] The consistency of this hypothesis for the EU member states will be tested in the present study.

1.4 Land acquisitions and the 2007-2008 global food price crisis

Natural resource-seeking investments emerged between 2004 and 2005, intensified after 2007-2008, when the global food price surge and the economic slowdown revived the interest in investing in agricultural land, peaking in 2009 and slowing down in 2010 (GRAIN 2008; Anseeuw *et al.* 2012; FAO 2012; Figure 8). During 2007-2008, the downward trend of real food prices of the previous 25 years came to an end, in combination with high and volatile petroleum and fertilizer prices (FAO 2009). Michell (2008) reports that the increase in the demand for coarse grains for biofuel production, both in the EU and in the US, impacted severely food prices (about 70% of the increase in maize prices and 40% increase in soybean prices) due to the reduction of grain stocks; the shift in land use due to the expansion of acreage under biofuel feedstock, which reduced, in turn, the production of other crops; as well as speculative activities. Developing countries' food bills soared by 56% over 2007-2008, with a negative impact on the balance of payments (Mittal 2009). In 2009, the global economy contracted by 2% (UNDESA 2011).

Figure 8. Reported land acquisitions for agricultural purposes (2000-2010)

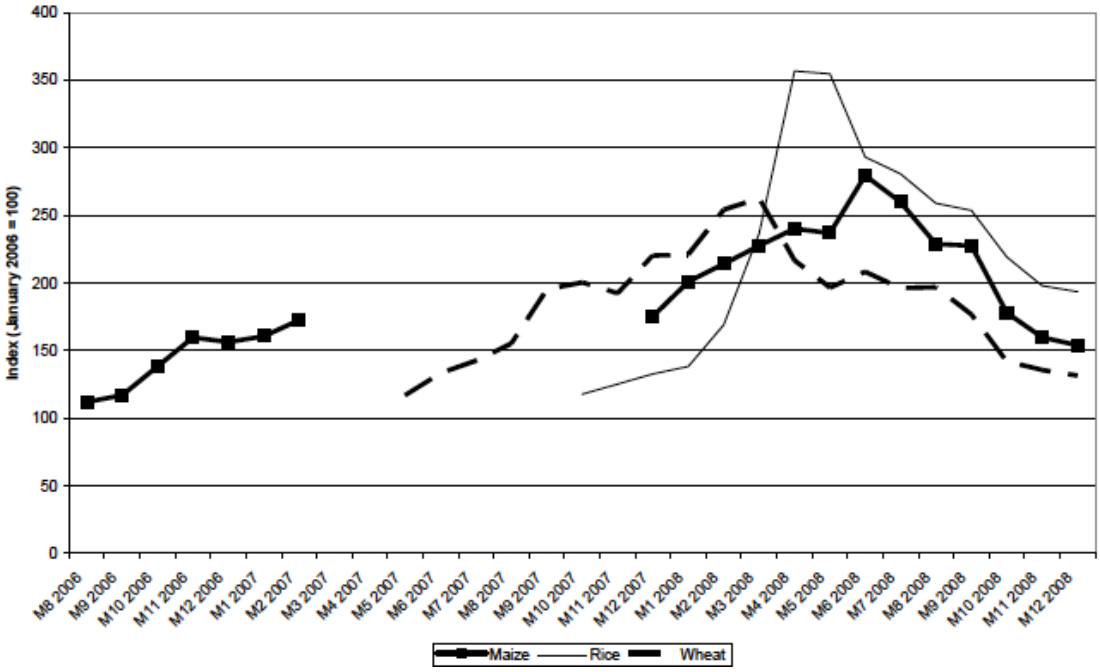


N=245 reported data; N= 102 for reliable data
Source: Anseeuw et al. (2012: 6)

Staple foods, such as maize, wheat and rice, were the most affected by the 2007-2008 food surge (Figure 9). The domestic price of these food commodities increased by 48% in real terms in developing countries (Dawe and Morales-Opazo 2009). Soaring food prices impacted most severely the world's low-income and food-deficit countries (Maros and Martin 2008), not only by putting at risk the main source of livelihood of

local populations (especially in the case of cash-crop farmers), but also by reducing their purchasing power (Benson *et al.* 2008; FAO *et al.* 2011; Minot 2012). Food represents, in fact, about 60-80% of consumer spending in the least developed countries[12], compared with only 10-20% in rich countries (UNCTAD 2008).

Figure 9. World cereal price surges and declines (July 2006-December 2008)



Source: Dawe and Morales-Opazo (2009: 9)

1.5 The role of water in land acquisitions

The aim of this section is to increase understanding on the role that water resources plays in foreign land acquisitions[13]. As the world is not scarce in land, but it is short of land *with* water resources (Allan *et al.* 2013), any land deal has an *invisible* water

[12] Fifty countries were designated by the United Nations as "least developed countries" (LDCs) in 2008, on the basis of their gross national income, Human Assets Index and Economic Vulnerability Index. These countries include: Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Cape Verde (until December 2007), Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Maldives, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Samoa, Sao Tome and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, Sudan, Timor–Leste, Togo, Tuvalu, Uganda, United Republic of Tanzania, Vanuatu, Yemen and Zambia.

[13] A thorough discussion of the implications of land acquisitions on water resources is beyond the scope of the present study but will be addressed in the second working paper carried out within this project.

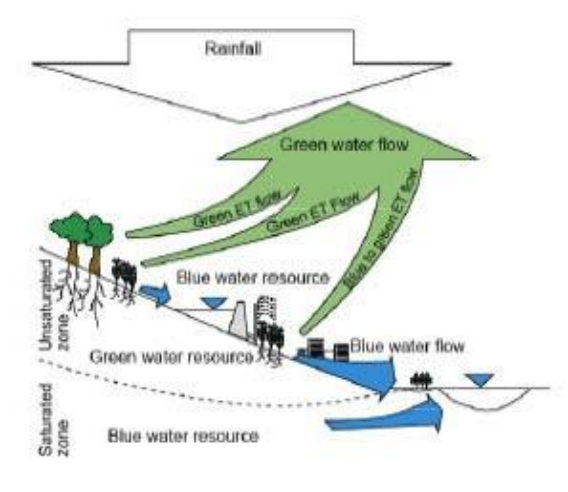
dimension that needs to be recognised. Land agreements thus *implicitly* entail the use of water resources in the targeted countries. Land deals may also involve the development of water infrastructures for storage and distribution, and have widespread impacts for downstream users resulting from restrictions or interruption of water flows upstream (Woodhouse and Ganho 2011). The water dimension implicit in land deals has been ignored until very recently. Among the few who recognised the role that water scarcity plays in driving agricultural land acquisitions, Mann and Smaller argued, "a critical motivation in the current trend towards large-scale land acquisitions is the water factor. (….) Today we see investment in water rights in foreign states, through the purchase or lease of land with associated water rights and access, as a critical part of the new process of securing long-term farming investments (2010: 6).

It has been argued that land deals are set to increase water demand by the agricultural sector in the targeted countries (Woodhouse and Ganho 2011). Agriculture uses water through plant transpiration and evaporation from soils. It is the biggest water-consuming sector globally and entails the most critical impacts on the water cycle of all anthropogenic activities (Baron *et al.* 2002). It accounts for 70% of total freshwater use on a global average (Molden 2007). If investors are allowed to exploit water resources in the purchased or leased area in order to start agricultural production, *water grabbing* – which involves the extraction, diversion and depletion of water resources – takes place. *Water grabbing* can involve the use of both green and blue water resources (Rulli *et al.* 2012; Allan *et al.* 2013) (for further details the reader is referred to the Box 2).
When the water 'appropriated' is blue water, irrigation water can be reduced not only for other agricultural areas, but also to other sectors (industrial and domestic), therefore impacting local economies and societies. The first quantitative assessment of the water appropriation implicit in land acquisitions has been carried out by Rulli *et al.* (2012). The study demonstrated that, first, 60% of the total grabbed water is 'appropriated' by a few countries (namely, the USA, United Arab Emirates, India, United Kingdom, Egypt, China, and Israel); secondly, that the countries affected the most by 'land grabbing' suffer from malnourishment and that the per capita volume of appropriated water is a substantial share of the water that would be sufficient to produce a balanced diet for local populations (about 1,300 m^3 per capita per year). To the extent that land deals result in the expansion of water infrastructures in the target countries, they may potentially benefit smallholder farmers by reducing the risk inherent in rainfed farming, especially in Sub-Saharan Africa. These investments however may also increase the competition for water between different uses to the detriment of local populations, as land deals often include priority access to water resources for the investors (Woodhouse and Ganho 2011). Last but not least, land deals have influenced transboundary water management in water basins such as the Mekong, Nile, Niger and Zambesi rivers (Jägerskog *et al.* 2012).

Box 2. Green and blue water resources

A distinction can be made between two different sources of agricultural water. *Green water* is the water that originates from rainfall and stays in the root-zone to support plant growth (Falkenmark 1995). It can only be used for vegetation and agricultural purposes, and underpins the largest share of food production globally (Fader *et al.* 2011). *Blue water* is the water contained in surface and groundwater bodies (Falkenmark and Rockström 2004) and that can be diverted for industrial and domestic uses or to irrigate crops.

Figure 10. Green and blue water resources



Source: Falkenmark and Rockström (2006: 129)

While all agricultural production requires large volumes of water resources, it makes a big difference whether the agriculture is rainfed or irrigated. Rainfed agriculture is in fact associated with relatively few negative environmental externalities (Aldaya *et al.* 2010). An increase in evaporatranspiration from green water sources is generally due to an expansion of the agricultural area but has relatively low impacts on blue water sources (Molden 2007). Irrigated agricultural systems, on the contrary, may irreversibly impact on natural water bodies by reducing stream flows and groundwater tables (Yang *et al.* 2006), and are generally associated with significant negative environmental externalities, such as water logging, salinisation, and soil degradation (Zehnder *et al.* 2003). These environmental externalities may result from the depletion of stream flows by crop water use in irrigation systems, additional impacts of storage of stream flow or runoff in dams or reservoirs, groundwater mining, herbicide and inefficient fertiliser application etc. (FAO 2011). Both rainfed and irrigate agriculture are associated, however, with a degradation of water quality due to the use of fertilizers and pesticides (Aldaya *et al.* 2010).

2. Data sources and methodology

2.1 The Land Matrix database

The analysis of the wave of large-scale land acquisitions presented in Section 3 is mainly based on the Beta version of the Land Matrix, an online public database reporting global land transactions, launched in April 2012 and upgraded in June 2013[14]. Since its inception, the Land Matrix has attracted not only a high degree of attention but also critiques. The partners of the Land Matrix project are ILC (*International Land Coalition*), CIRAD (*Centre de coopération internationale en recherche agronomique pour le développeme*t), CDE (*Centre for Development and Environment at the University of Bern*), GIZ (*Deutsche Gesellschaft fu□r Internationale Zusammenarbeit*) and GIGA (*German Institute of Global and Area Studies*), with the support of Oxfam, the Swiss Development Cooperation and the European Union. The aim of the Land Matrix project is mainly twofold: first, to promote more transparency in decision-making and investments in land; secondly, to widen public participation and citizen involvement by making data available and understandable (Anseeuw 2013).

The land transactions included in the Land Matrix database:

- Entail a transfer of rights to use, control, or own land through sale, lease, or concession;
- Imply a conversion from land used by smallholders, or for important environmental functions, to large-scale commercial use;
- Are 200 hectares or larger;
- Were not concluded before the year 2000.

On Land Matrix are recorded cases of intended and realised land deals involving foreign or domestic investors, and at any level of implementation (under negotiation, start-up phase, in operation, failed)[15]. The reported deals refer to six main sectors: food, fuel, timber, carbon sequestration, mineral extraction, and tourism (Anseeuw *et al.* 2012). In the Beta versions of the Land Matrix, data are classified according to a number of levels of reliability and crosschecked (Anseeuw *et al.* 2013). On the one hand, a lack of transparency in the involved countries and the biases inherent in public announcements or media sources, seem to suggest that the scale of the land acquisitions could be under-estimated. For instance, conflict-ridden or fragile countries are likely to provide incomplete information (Anseeuw *et al.* 2012; 2013*)*. On the other hand, it has been showed that many of the reported land transactions have either never materialised or are not in operation (Verhoeven and Woertz 2012). According to Pearce (2013), databases

[14] www.landmatrix.org

[15] More detailed information on the definitions deployed in Land Matrix is provided in the Appendix of the study (Section "Land acquisitions").

on land transactions are generally influenced by both over- and under-accounting. The biases inherent in the data reported in the Land Matrix database have been widely acknowledged by the authors themselves. They are currently seeking to improve the reliability of data by setting up long-term partnerships (such as, the AU-UNECA-African portal with Land and Property Information LPI focal points); establishing networks of key informants and collaboration with existing or new national initiatives in order to constitute decentralised land observatories based on multi-stakeholder participation (Anseeuw 2013). Other challenges currently facing the Land Matrix Observatory regard: the measurement of the phenomenon, as the existing methodologies for measuring land deals are numerous and therefore comparisons are difficult to be made; the monitoring of land deals, both with regards to the status of the negotiation and the implementation; and finally, communication with users (Anseeuw 2013). Although the Land Matrix database may provide "the most comprehensive indication to date of the scale and features of land deals" (Anseeuw *et al.* 2012: 19), a more critical analysis of the phenomenon grounded on *case studies* through which understanding the context and measuring the impacts is needed (Edelman 2013).

2.2 Methodology

The purpose of this research is to increase knowledge on the role of the EU in the context of the current wave of land acquisitions. As previously stated, the analysis presented in the following section of this report is mainly based on the Beta version of the Land Matrix Database. The dataset was downloaded in October 2013, 16th.

The Land Matrix database reports the extension of each deal (area of each land transaction in term of Ha). Implicitly, it is assumed that these deals are the results of some larger economic process involving the demand for land resources both at the global and local scale. Global demand and its drivers are somehow exogenous determinants of such land transaction. Yet, as it will be noticed, in most of the cases the extension already under cultivation at the time of inclusion of the specific transaction within the Land Matrix database is rather small if compared with the total extension of the land deal.

It is important to notice that some assumptions are needed to predict the use of the land and the growth of the operation scale, either where the deals have been concluded but which are still not in operation and for deals under negotiation. We can assume that exogenous demand again will be the driver and that such demand could either push the growth of the extension in land under specific cultivation, and /or induce more new large deals. This is to say that the deals where the negotiation has been concluded but which are still not in operation can be considered as a *stock* of available land that can be easily deployed, in order to satisfy any increasing demand of goods. The determinants by which incumbent owners may have advantage over new entrants in the land market and in production, even though very important, cannot be accounted for and it is therefore impossible to predict the pace of growth in contracts or in land in operation.

One limitation of our elaboration is that Land Matrix data so far do not work with flow of products but just considers land as a stock. This limitation is somehow built in the database itself, making the dynamic analysis of the phenomenon quite limited. Another specific limitation pertain the fact that land is never a homogenous resource, either in quality or in terms of infrastructure and accessibility, just to mention a few elements. Dynamic processes explaining the possible growth of the extension of land under operation within the ongoing deals should take into consideration not only the exogenous demand but conflicting potential uses and also conflicts with local populations which can determine the pace of the investment.

In our perspective these assumptions are vital since they imply that policy at the EU level, which influences the *demand* for energy or food crops, has a direct potential to determine substantially the future of land acquisitions and land uses by, for instance, promoting more responsible investments and sustainable agriculture not only for the land deals currently concluded but not yet in operation, but also for those that are still under negotiation, therefore influencing the use of land under contracts and concessions. A pre-requisite for the development of such principles is however the improvement of available data and the promotion of transparency.

The following section of this report will present the results of the analysis of the Land Matrix database. In particular, it will focus on:

- The EU-28 member states involved as *investors* in land acquisitions;
- European and EU-28 member states involved as *target countries* in land acquisitions;
- Agriculture-oriented projects, both for the production of food crops and agrofuels.

The size of the investments has been measured by using contract size data, when available. Data on the production size and the intended size of investments were used when contract size data were not available. The land transactions that will be referred to as *realised* include both those where production has already started as well as where the negotiation is concluded (either by means of an oral or written agreement) but production has not started yet.

An original aspect of the study is provided by the fact that, in order to explore the competition between food and energy production in the context of the EU land acquisitions, an analysis of the final uses of land acquired by the EU in the target countries was carried out. The analysis regarded all the deals whose purpose was explicitly categorised as "agriculture" in the Land Matrix database. Under this classification both the production of food and feedstock are included. In order to distinguish these two uses, we crosschecked two sources of information: i) the sources reported by the Land Matrix database for each land transactions. These sources include not only official studies and reports but also blogs, online newspapers etc.; ii) information about investors' activities in the target country or, if not available, other

countries (websites, online newspapers etc.). The use of this methodology allowed us to estimate the *actual* final use of the land on the basis of information on the commercial activities put in place by investors. This is particularly important as many crops do have flexible uses as they can serve both nutritional, energy and other industrial uses. Land transactions were classified on the basis of the nature of the crops grown only when i) and ii) were not available. Our classification thus differs from the ones provided by other studies, such as Borras *et al.* (2011) and Anseeuw *et al.* (2012), as it refers not only to the analysis of the possible alternative uses of the crops grown in the land but also to the actual use according to the information provided by the companies websites and documentations included in the Land Matrix database.

The final purposes of the EU land acquisitions are classified into the following main categories:

- **Food**, when the land is used to grow crops which are used for the production of food only;
- **Agro-fuel**, when the land is used to grow crops used for biofuel production only;
- **Flexible**, when the land is used to grow multiple crops which are used for multiple uses (food, biofuel, industrial use) or single crops which can be used for multiple purposes (food production, biofuel or industrial use, such as for instance the case of oil palm plantations). We also distinguish, within this category, between flexible crops used for food and biofuel only and flexible crops which are a combination of food and industrial use or food, industrial use and biofuel, or biofuel and industrial use;
- **Other**, when the land is used for other purposes with respect to the previous categories. This category mainly refers to non-food crops, such as rubber, flowers, or the land used for tourism and conservation practices.
- **Unknown,** when it is impossible to classify the use of the land among the previous categories for the lack of information.

Finally, information on land deals, such as number of deals and hectares of land acquired has been combined with other environmental and socio-economic information. For this purpose, the study deploys the Human Development Index (HDI). The HDI is a summary measure of human development. It measures the average achievements in a country in three basic dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living. Each dimension of development is evaluated based on the following indices, respectively: life expectancy at birth, mean years of schooling and expected years of schooling, GNI per capita (PPP $) (UNDP 2013).

A *water availability index*, based on Falkenmark (1989) was also developed. It was assumed that countries with less than 1700 m^3 of water per capita per year are water scarce and that, on the contrary, above this threshold a country is water-secure. It is noteworthy to say that this indicator considers only the water available in surface and groundwater resources, ignoring soil (green) water resources due to limitations in the available datasets. An index of exploitation of suitable agricultural land was also

developed. This is defined as the ratio between a country's agricultural land (arable land plus permanent crops) and the amount of land defined as *suitable*. Data on land resources refer to the year 2002, i.e. at the beginning of the wave of farming land acquisitions. The use of these data will enable us to appreciate the impact of land acquisitions on resource endowments in the target countries *before* the beginning of the phenomenon under consideration here. The datasets deployed are AQUASTAT for water resources and FAOSTAT for land resources. By combining this set of environmental and socio-economic information, the study aims to identify the drivers of land acquisitions as well as the potential implications for target countries.

3. Global and EU land acquisitions

3.1 Global land acquisitions

The purpose of this section is to provide an overview of the phenomenon of large-scale land acquisitions as defined in the previous sections, both at the global (Section 3.1) and at the EU level (Section 3.2). More specifically, these sections will:

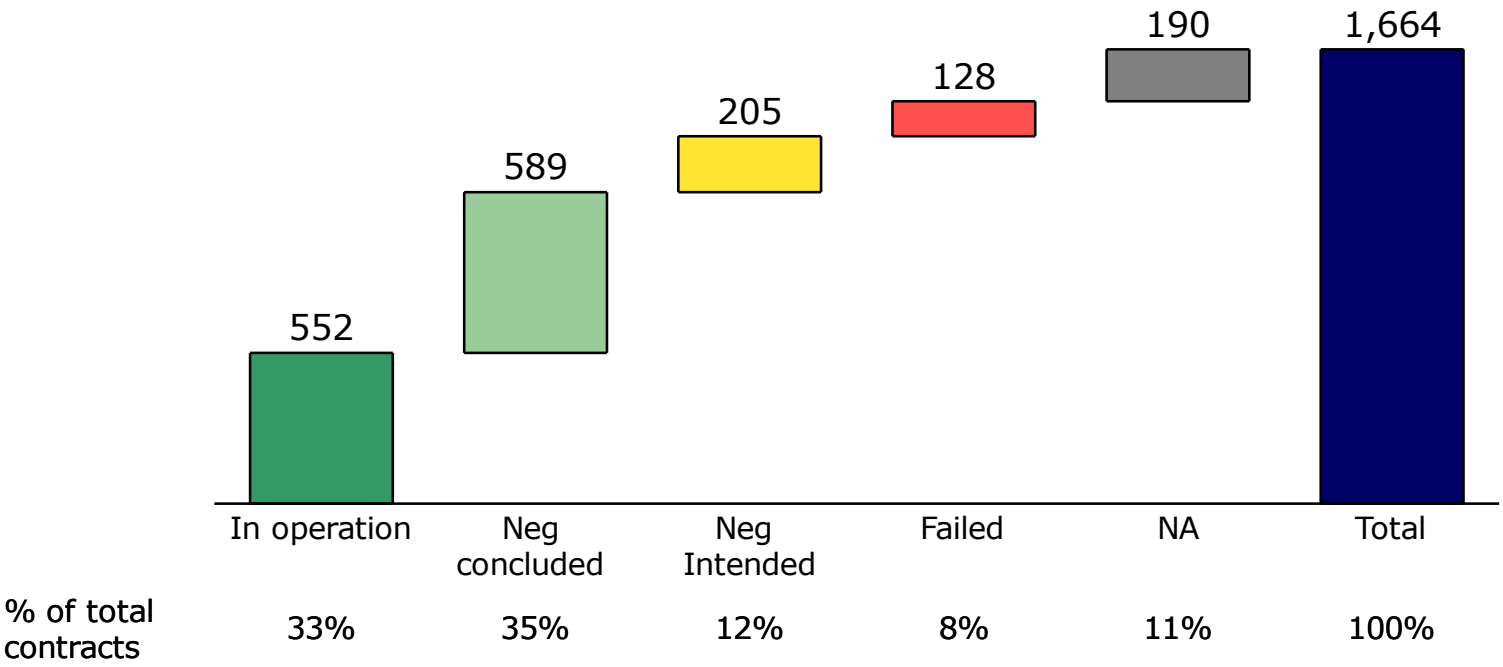
- Investigate the scope of the phenomenon and the status of the reported negotiations;
- Identify the target continents and countries;
- Analyse the profile of investors;
- Assess the type of land agreement, differentiating between *partnerships between foreign investors* and *partnerships between foreign investors and target countries;*
- Provide an assessment of the purposes of land acquisitions, focusing in particular on the competition between energy and food purposes.

An in-depth analysis of the main EU investor countries will also be pursued.

3.1.1 Scope of the phenomenon and status of negotiations

As showed in Figure 11, the number of land transactions reported in the Land Matrix database is 1,664. They include intended, realised and failed land deals, and can involve both single and multiple investor countries. A large portion of these land agreements has been formalized by means of a written or oral agreement but production has not started in all these cases. The realised land deals, including in operation and/or concluded deals, account for 69% of the reported transactions. Only 33% of the reported land deals are in fact in operation, for one third of which the target country is also one of the investors; 8% are failed; whereas there is no information on the status of the negotiation for 11% of total land deals.

Figure 11. Number of contracts and negotiation status



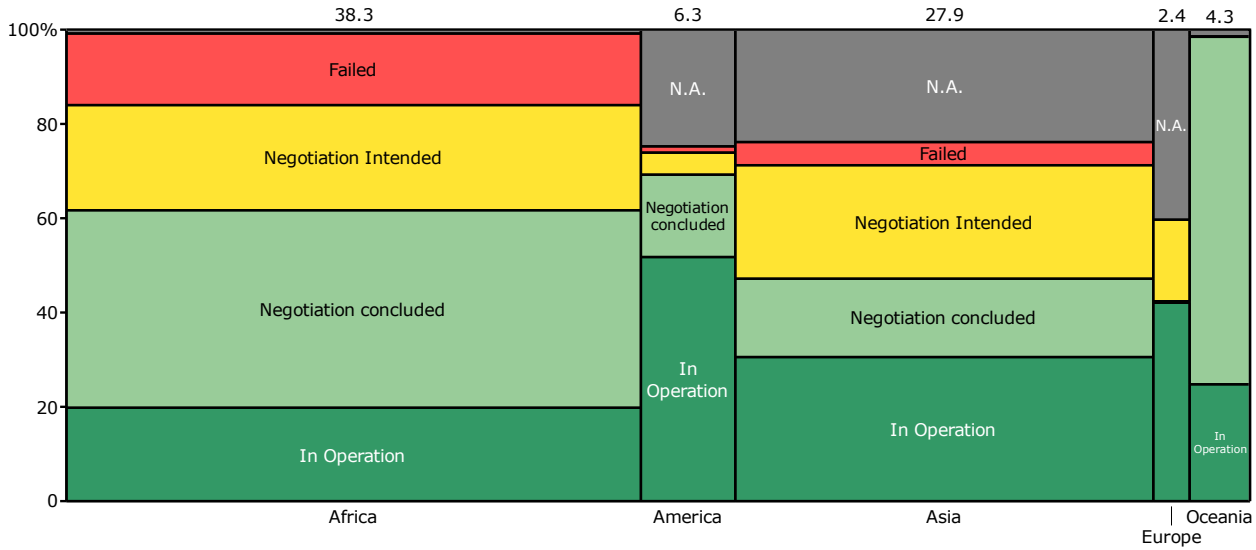
Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

The reported land deals refer to about 80 Million ha of farming land around the world. This land corresponds to 5.3% of the world's agricultural land. In over 46 Million ha production has started and/or the agreement has been concluded. This amount is almost equivalent to the area of Spain. Africa and Asia are the most targeted continents, as showed in Figure 12. In 60% of the land transactions targeting Africa, the negotiation has been concluded or production has started. In Asia, the negotiation has been concluded or production has started in about 50% of the targeted land; whereas there is no information available on about 20% of land deals. Almost the totality of the land transactions involving Oceania have been formalised by an agreement or are already in operation.

Actual production has started in almost 22 Million ha (27% of total land interested by the phenomenon), corresponding to 1.5% of the world's agricultural land. Production has started in 44% of the deals concluded by means of a written or oral agreement, including also cases with no info available on the status of the negotiation. The land deals where production has already started are mainly those involving only *one* investor country (83%).

The land deals currently under negotiation are 205. They refer to 16 Million ha of land: 53% of this land is in Africa (140 deals); 42% in Asia (51 deals). In one third of these intended deals the target country is also involved in the negotiation as an investor. This type of land agreements will be referred to as *partnerships between foreign investors only* (PFI) (i.e. all investors are from *outside* the target country), to be distinguished from *partnerships between foreign investors and target countries* (PFITC) (i.e. the target country participates in the land deal).

Figure 12. Status of the negotiation of global land deals and distribution in the target continents (Million ha and % of total land)

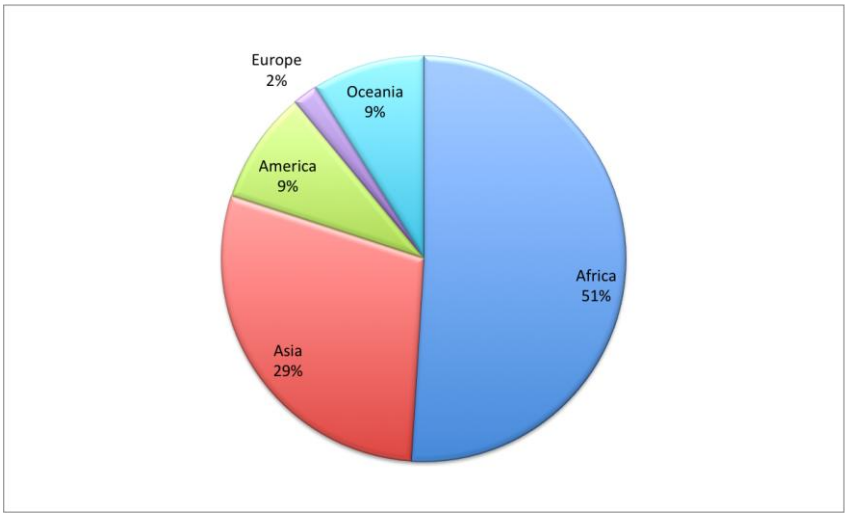


Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

3.1.2 Realised land deals: targeted continents and countries

The realised deals regard 46 Million ha of land (39% of total reported deals in any negotiation status). As showed in the Figure below, the realised investments (i.e. the land agreements which are currently in operation and/or concluded) target Africa and Asia the most. In these two continents, according to FAO (2003), there is new land to bring under cultivation. The two continents account, respectively, for 51% (almost 24 Million ha of land) and 29% (over 13 Million ha) of the land deals that have been realised at the global level. Europe accounts for only 2% of the realised land transactions (about 1 Million ha of farming land); Oceania (almost 4 Million ha) and America (over 4 Million ha) account for 9% each.

Figure 13. Target continents (% of total ha, deals in operation and/or concluded)

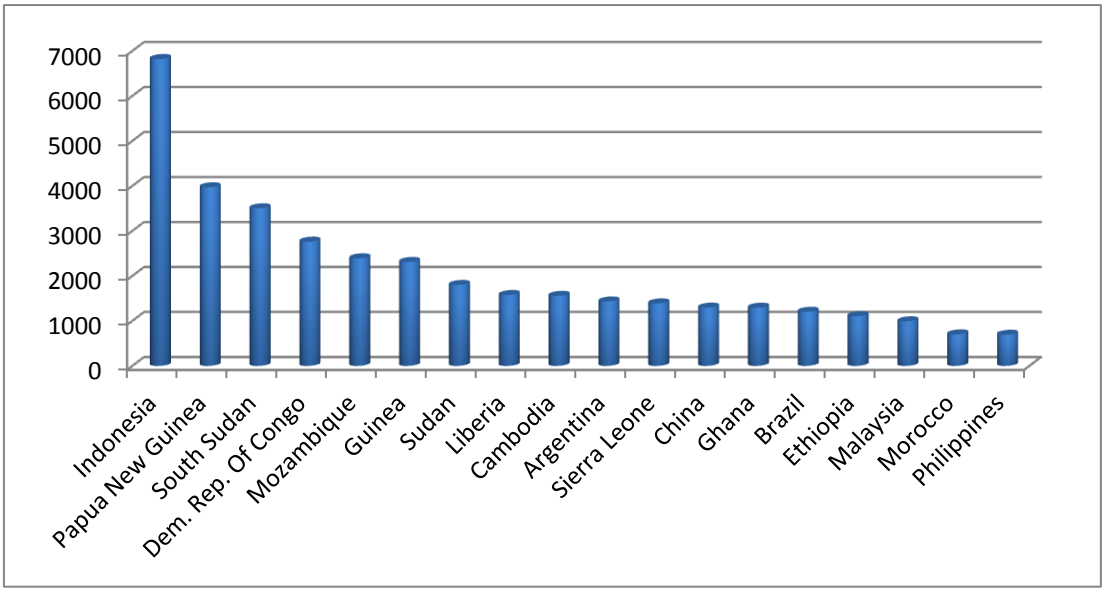


	Africa	Asia	America	Europe	Oceania
Million ha	24	13	4	1	4

Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

Figure 14 shows the world's most targeted countries by large-scale land acquisitions by size of the acquired land. The 18 countries showed in Figure 14 account for 80% of the *realised* land transactions (in operation and concluded deals) in terms of acquired ha. Indonesia is by far the most targeted country, with a total size of acquired land of almost 7 Million ha. The investments in Indonesia, Papua New Guinea and South Sudan (>3.5 Million ha each), account for over 30% of the realised land transactions at the global level. Ten out of the eighteen most targeted countries are in the African continent (namely, South Sudan, Congo, Mozambique, Guinea, Sudan, Liberia, Sierra Leone, Ghana, Ethiopia, Morocco).

Figure 14. Target countries (Thousand ha, deals in operation and/or concluded)



	Total acquired land in these target countries	**Total acquired land in the world by single and multiple investor countries**	**Cumulative percentage of total realised land deals in the 18 countries**
World top target countries	Almost 37 Million ha	About 46 Million ha	80%

Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

Table 1 ranks the most targeted countries by number of *realised* land transactions, i.e. the deals in operation and/or concluded. The countries ranked in the table account for 80% of the total land acquired at the global level. The number of land deals of a country can be considered as an indicator of the *rush* for farming land and also the *feasibility* of pursuing such investments. Cambodia and Indonesia are the most targeted countries in terms of number of realised land transactions (>100 deals each). Interestingly, Papua New Guinea, ranked as the second top destination in terms of acquired land in hectares (Figure 14), shows only about 40 land transactions. South Sudan, ranked as the third top destination in terms of hectares of acquired land (Figure 14), is not ranked in the table below, as the number of land deals realised in the country is negligible.

Table 1. Target countries at the global level (number of deals in operation and/or concluded)

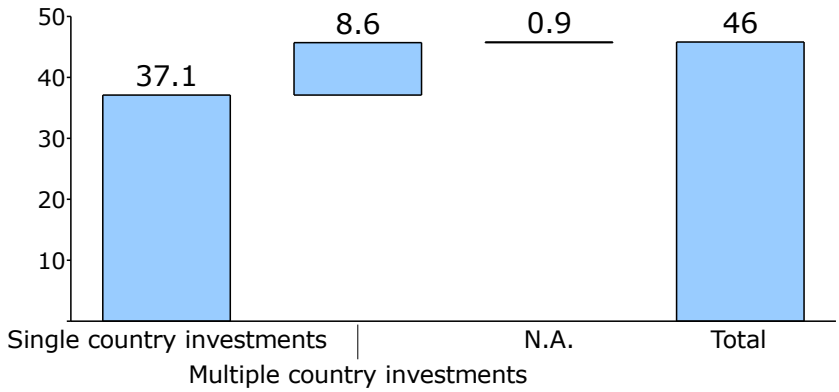
By contract (number)	
Cambodia	138
Indonesia	104
Ethiopia	81
Mozambique	77
Lao People's Democratic Republic	48
Papua New Guinea	43
Peru	39
India	36
United Republic of Tanzania	32
Colombia	31
Argentina	30
Philippines	28
Ghana	27
Brazil	26
Nigeria	25
Uruguay	22
Sudan	21
Zambia	20
Sierra Leone	18
Liberia	18
Senegal	17
China	16

Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

3.1.3 Profile of investors and main purposes of the investments

As shown by Figure 15, the largest majority of the *realised* land transactions are pursued by *single investor countries*, which account for over 80% of total deals. About 19% involve more than one country (*multiple investor countries*); whereas there is no information about the investors in 1% of the reported land transactions. Most of the investments pursued by more than one investor country are lease/concession and, in over 60% of the cases, the target country is also involved in the transaction as one of the investors (*partnerships between foreign investors and target countries*).

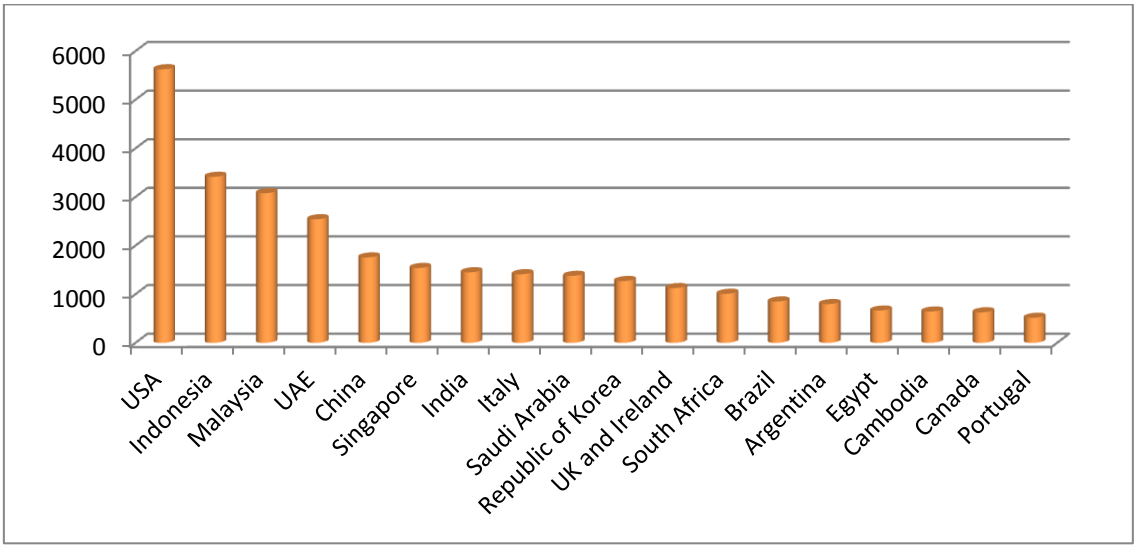
Figure 15. Profile of the investors (Million ha, deals in operation and/or concluded)



Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

Figure 16 shows the main investor countries currently involved in the land acquisitions realised so far. These 18 countries account for 80% of the deals, which are in operation and/or concluded. With over 5.5 Million ha of land, the USA is ranked as the first investor country involved in land acquisitions; followed by Indonesia and Malaysia (over 3 Million ha each), and UAE (about 2.5 Million ha). The investments pursued by the USA are mainly located in Africa, but also South America and, to a lesser extent, Oceania. Indonesia is mainly involved in *national agreements*. Malaysia's investments instead, are mainly located in Papua New Guinea, Indonesia and Cambodia. The UAE investments are concentrated in Africa, especially in South Sudan (over 2 Million ha for conservation and tourism), Sudan and Egypt. The rest of the countries are all below 2 Million ha. Three EU countries (namely, Italy, the UK and Portugal) are ranked among the world's top investors in foreign agricultural land. In all these countries, land acquisitions are fundamentally related to the production of agrofuels or flexible crops (further details are provided in Sections 3.2 and 4.2).

Figure 16. Investor countries (Thousand ha, single country investments, deals in operation and/or concluded)



	Total acquired land by these investors	**Cumulative percentage of total realised land deals**
World top single-country investors	About 30 Million ha	80%

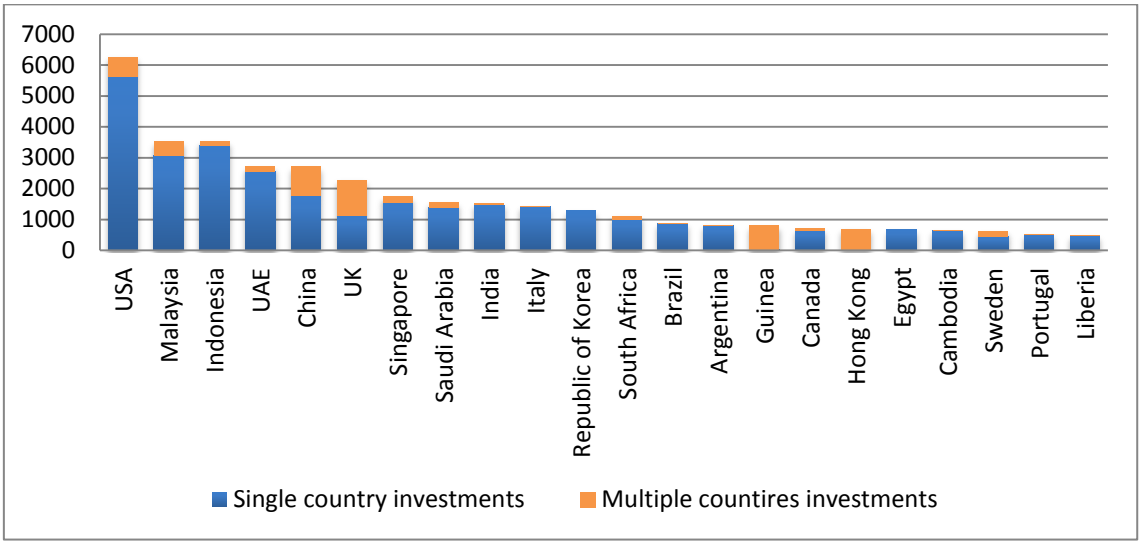
Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

Figure 17 below shows that the vast majority of countries have developed a national presence by acquiring control or property of vast areas of land outside their boundaries. The general picture is that multiple country investments constitute a small fraction of the total for all the countries analyzed here, with the exception of the USA, UK and China, as well as Sweden, to some extent. Asian investors show a quite different situation as the involvement of local government occurs with some frequency. The role of Hong Kong as a global financial center is emerging. Guinea is involved in one domestic land acquisitions (i.e. the national government is the only investor), three land acquisitions in partnership with the UK, and another by Italy.

The USA is the largest investor at the global level, with investments mainly in Africa and Oceania (Papua New Guinea), but also Latin America and, to a lesser extent, Asia. Indonesia has investments in Timor-Leste and China, but mainly within its territory for the production of oil palm and sugar cane (over 3 Million ha). Malaysia has investments for 0.5 Million ha within its territory, mainly for oil palm, but mainly in Indonesia, Papua New Guinea and Cambodia, mainly for oil palm (2.5 Million ha). Indonesia and Malaysia are by far the largest global producers of oil palm in the world[16]. It is widely known that the palm oil business is a key driver for deforestation in these two countries. Indonesia, for instance, is the largest greenhouse gas emitter after China and the United States. The UAE invests only outside its own boundaries (over 2 Million ha of land in South Sudan; but also in Egypt, Sudan and other countries, and to a lesser extent in Asia, namely in Pakistan and the Philippines). The purposes of these investments are mainly the production of foodstuffs. India invests within its territory (200.000 ha) but mainly outside (1.2 Million ha). Interestingly India's investment are mainly located in Africa (mainly Ghana, Ethiopia and Mozambique) but also in Asia (Malaysia, Cambodia, Indonesia and Laos) The purpose of India's investments are the production of a number of diverse crops which include cereals, flexible crops (oil palm, sugar cane and corn), high-value foods (such as tea and coffee) but also cotton. Saudi Arabia, as the UAE, invests mainly in Africa, but also in Turkey and Pakistan, and Argentina. The purposes of these investments are mainly the production of foodstuffs such as cereals, fruits and vegetables. Canada mainly invests in Africa and Brazil.

[16] http://www.indexmundi.com/agriculture/?commodity=palm-oil&

Figure 17. Investor countries (Thousand ha, single and multiple country investments, deals in operation and/or concluded)

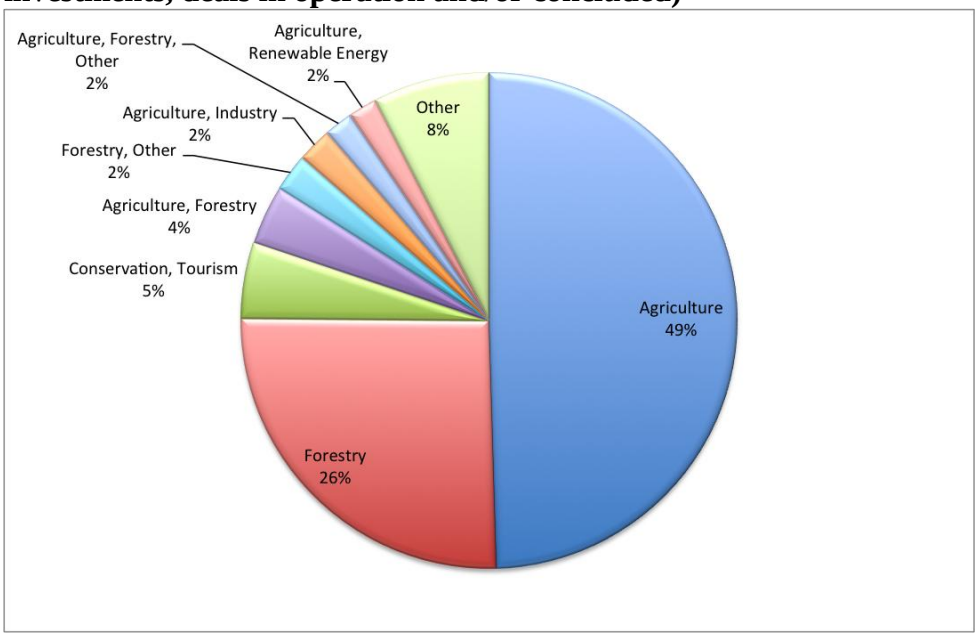


	Total acquired land by these investors	**Cumulative percentage of total realised land deals**
World top multiple-country investors	About 36.4 Million ha	80%

Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

Figure 18 shows the main purposes of global land acquisitions associated with transactions concluded and/or in operation. As shown by the graph, agricultural production is the main purpose of the deals currently in operation and/or concluded. This amount reaches up to almost 23 Million ha (49%). The second most relevant use of land is *forestry*, which accounts for almost 12 Million ha (26%). The rest of the uses all fall below 2.3 Million ha each.

Figure 18. Purpose of land acquisitions (ha, single and multiple country investments, deals in operation and/or concluded)



Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

Table 2 shows the median of the size of the investments and the number of the realised land deals (in operation and concluded) by purpose and target continent. The table shows that most of the realised land deals refer to the category "agriculture" (which includes the production of crops for food, energy and industrial purposes) and "forestry". The continent with the majority of deals for agriculture is Africa, followed by Asia, America, Europe and Oceania. Among these, Europe shows the largest deals in terms of hectares of land per deal, as indicated by the values of the medians, followed by Oceania, Asia, Africa and America. Moreover, the size of the deals intended for agriculture are generally smaller than those for forestry and conservation or other purposes, as indicated in the table. Therefore, even though the number of deals for crops production is higher in number, the size of the deals is in general smaller than the ones dedicated to other uses.

Table 2. Size of investments (Thousand ha) and number of realised deals (in operation and /or concluded) by target continent and purpose

	Africa		America		Asia		Europe		Oceania		GRAND TOTAL	
	Median	N° of deals	Median	N° of deals	Median	N° of deals	Median	N° of deals	Median	N° of deals	Median	N° of deals
Agriculture	7	561	4	177	8	419	49	29	21	17	8	1203
Forestry	31	60	16	32	17	44	12	1	72	4	22	141
Conservation, Tourism	2,280	4	-	-	-	-	-	-	-	-	2,800	4
Agriculture, Forestry	3	13	74	4	10	18	-	-	25	17	13	52
Forestry, Other	-	-	-	-	168	2	-	-	790	1	315	3
Agriculture, Industry	5	4	9	11	9	18	-	-	-	-	8	33
Agriculture, Renewable Energy	16	26	-	-	3	3	-	-	-	-	15	29
GRAND TOTAL	9	668	5	224	9	504	43	30	25	39	9	1465

Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

3.2 The role of the EU in large-scale land acquisitions

3.2.1 Land acquisitions *by* the EU: investments pursued by single investor countries

Large-scale land acquisitions pursued by the EU countries (as single investor countries) involve over 8 Million ha of agricultural land[17]. This area is almost equal to the area of Austria. If we add also the land deals pursued by groups of investor countries (analysed in more detail in Section 4.2.2) we reach up to 13.7 Million ha of land.

Table 3 and 4 show, respectively, the size and number of the land deals pursued by EU single investor countries by target continent and negotiation status. Production has started in 1.6 Million ha of land (20% of total land). The majority of the EU land deals currently in operation are those pursued *within* Europe. The negotiation has been concluded, whether with a written or oral agreement, in 3.2 Million ha of land (40%). Africa is by far the continent where most the EU land agreements have been concluded. **This is to say that the *realised* land deals pursued by the EU countries involve almost 5 Million ha of land both outside and within the EU.** The land transactions that have been pursued in these countries are 160. As showed by Table 4, the majority of these land deals (89 deals concluded and in operation out of 160) have targeted the African continent. The land deals realised in America and Asia account for 18% each (respectively, 29 and 28 land deals); whereas, the land acquisitions *within* the EU account for 9% of the total land deals realised by the EU countries (14 land deals). The intended deals regard 1.5 Million ha and mainly target Africa (14%). In 15% of the land projects have failed; whereas, there is no information available on 10%. It is noteworthy to say that none of the acquisitions pursued by EU countries *in* Europe has failed and, also, that EU land agreements have not targeted Oceania so far.

Table 3. Size of land deals pursued by EU single investor countries (Thousand ha) by destination continent and negotiation status

	Africa	America	Asia	Europe	Grand Total
In operation	496	222	213	715	1,646
Concluded	3,082	51	118	8	3,259
Intended	954	3	196	2	1,155
Failed	1,180	13	23	-	1,216
NA	26	298	88	396	808
Grand total	5,738	587	638	1,121	8,084

Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

[17] This figure includes the land involved in land transactions in any negotiation status (failed, in operation, concluded, intended and N/A).

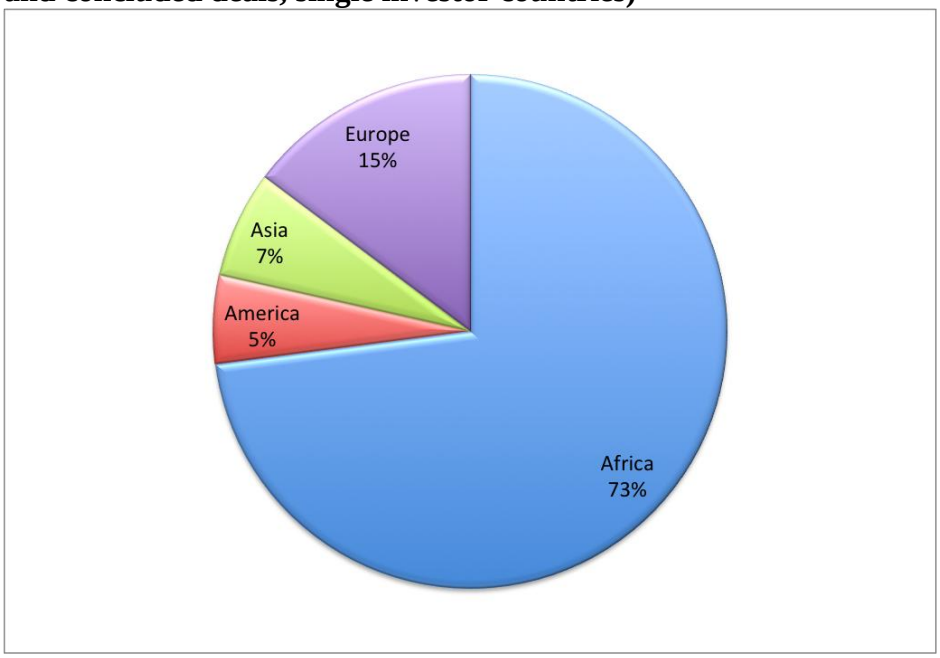
Table 4. Number of land deals pursued by EU single investor countries (ha) by destination continent and negotiation status

	Africa	America	Asia	Europe	Grand Total
In operation	41	21	17	13	92
Concluded	48	8	11	1	68
Intended	22	1	3	1	27
Failed	24	2	6	-	32
NA	4	6	3	6	19

Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

Figure 19 shows the continents where land deals have been *realised* (i.e. in operation and/or concluded agreements) by the EU member states[18]. The investments involving more than one country are *not* included here and will be addressed in the following section of the present study. The most target continent is Africa (3.5 Million ha), followed by Europe (about 700,000 ha), Asia (about 330,000 ha) and America (about 270,000 ha).

Figure 19. Continents targeted by EU land acquisitions (% of total ha, in operation and concluded deals, single investor countries)



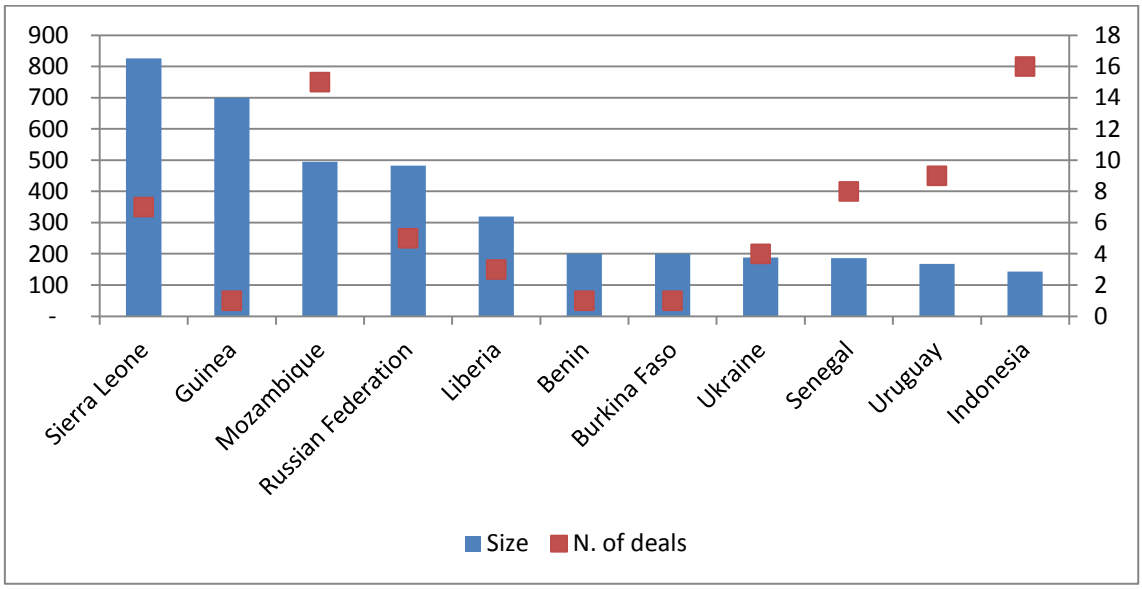
Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

Figure 20 shows the countries targeted the most by EU investments. The land involved in these transactions amount to about 4 Million ha and accounts for 80% of the agreements realised (in operation and/or concluded deals) by EU single investor

[18] The data shown here are the sum of the proportion of land deals showed in Table 4 that are concluded and/or in operation.

countries. Sierra Leone, Guinea and Mozambique are the main targets of EU investments (40% of total realised land deals, over 2 Million ha). With the exception of Mozambique it is noteworthy that the number of deals set in place is rather limited, suggesting that the size of each of them is extremely large. The information provided in this Figure complete the information reported in Table 2 about the median size of the investments in the different continents.

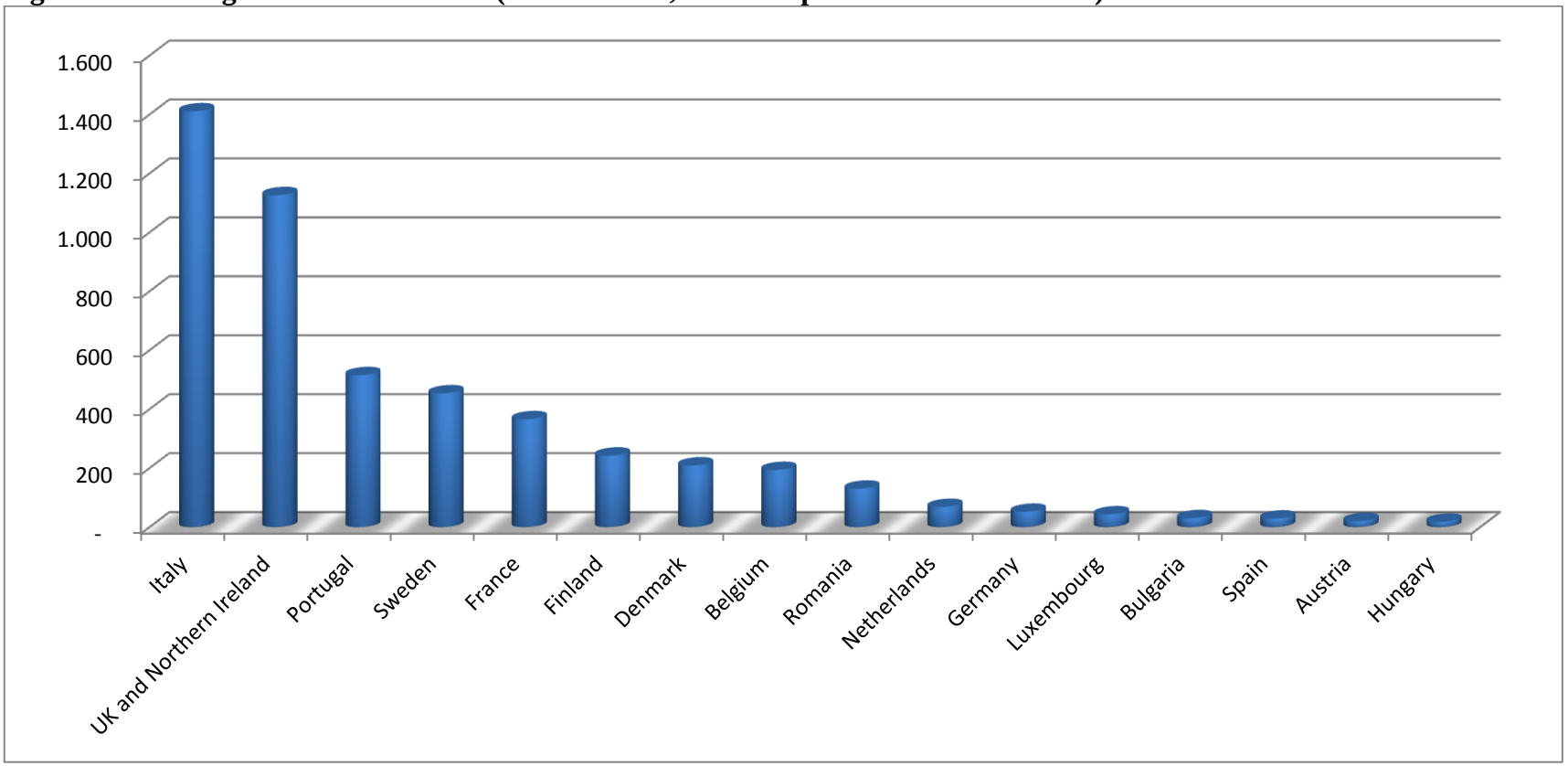
Figure 20. Countries targeted by EU land acquisitions (total ha, in operation and concluded deals, single EU investor countries)



Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

The EU investor countries are ranked in Figure 21 by the size of the realised land deals (in operation and/or concluded). These investments amount to almost 5 million ha of land. With almost 1.4 Million ha of acquired land, Italy is the main investor country in the EU, followed by the UK (over 1 Million ha). The investments pursued by these two countries alone account for over 50% of the EU investments. The land transactions realised by Portugal, Sweden and France range between 3.6 and 5 Thousand ha. These top 5 investors realise 80% of the EU land deals.

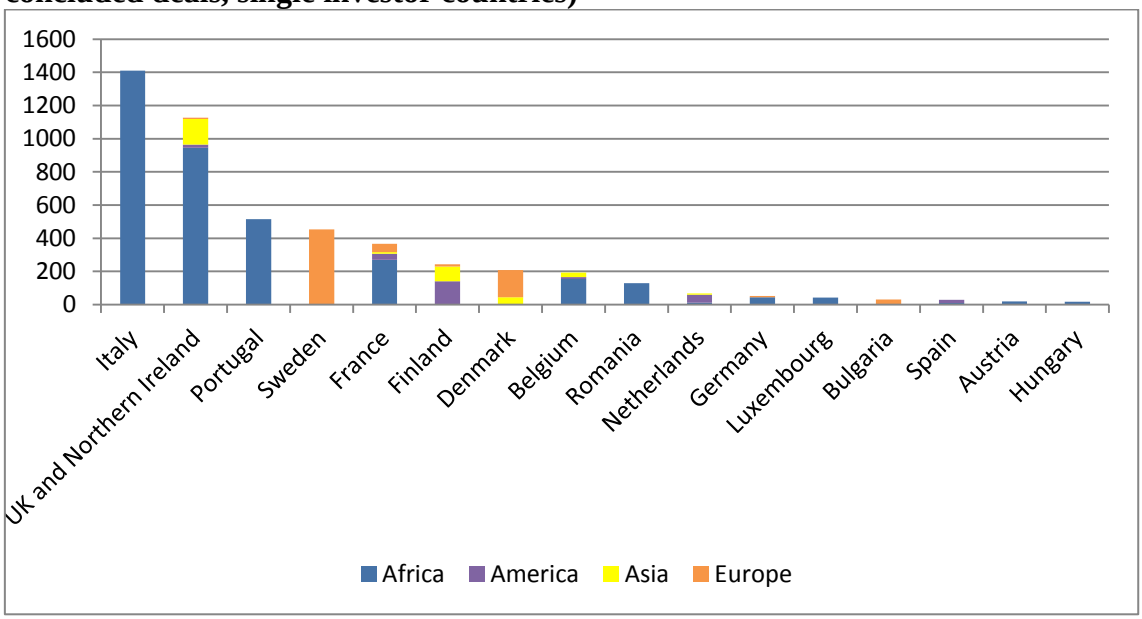
Figure 21. EU single investor countries (Thousand ha, deals in operation and concluded)



Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

Figure 22 shows the size of the investments realised by the EU countries in the different continents. Italy is ranked as the first single-country investor in the EU and invests exclusively in Africa as well as (in decreasing order by size of the acquired land) Portugal (6 deals in total), Romania (2 deals), Austria (1 deal) and Hungary (1 deal). Land deals in Africa generally occupy quite large tracks of land. Interestingly, as it will be shown in the following section, countries' ranking changes quite substantially by adding the investments pursued in partnership with other countries (*multiple-country investments*). Italy's single land agreements (19 deals in total) tend to be substantially larger than those pursued by the UK (47 deals in total). Most of the investments pursued by the EU countries are in the African continent, although to different extents. The countries with the most diversified concentration of investments are the UK and France, whose investments can be found in all the four continents (no EU investments are pursued in Oceania). Northern EU countries operate (such as Sweden and Denmark) substantially within the EU as well as Bulgaria, whereas they do not invest in Africa. France and Germany also pursue investments in the EU territory, with different extents. Finland operates in America, Asia and Europe with only three big investments. The investments pursued by the Netherlands, Germany, Luxemburg, Bulgaria, Spain, Austria and Hungary are all below 70 Thousand ha of land per country, despite some of them are quite scarce in terms of agricultural land available.

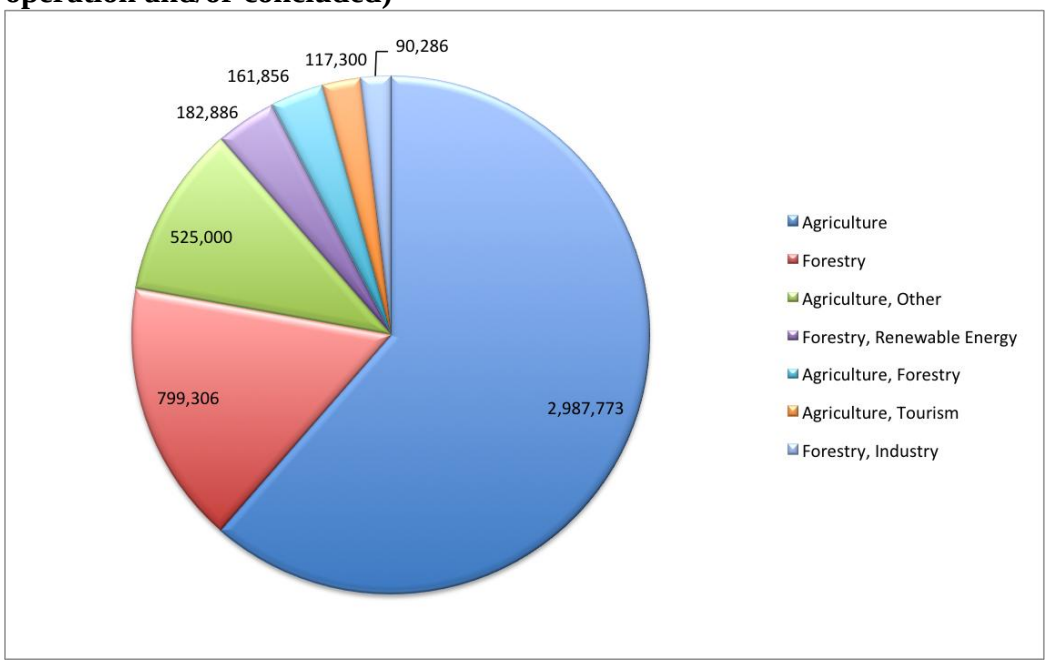
Figure 22. EU investors and target continents (Thousand ha, in operation and/or concluded deals, single investor countries)



Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

Figure 23 shows the purposes of the land acquisitions pursued by the EU countries. The deals included in this graph account for 99% of the land deals pursued by the EU countries as single investors. Agriculture is by far the largest driver of large-scale land acquisitions: over 60% of total land deals are pursued for agricultural production. Importantly, these projects include not only the production of food crops but also agrofuels. The extent to which the farming land acquired by EU countries is devoted to biofuel or food production will be the focus of the following section 4.2 of this study. Forestry is the second most important use of land (14% of the total size of the realised deals).

Figure 23. Purpose of EU land acquisitions (ha, single investor countries, deals in operation and/or concluded)

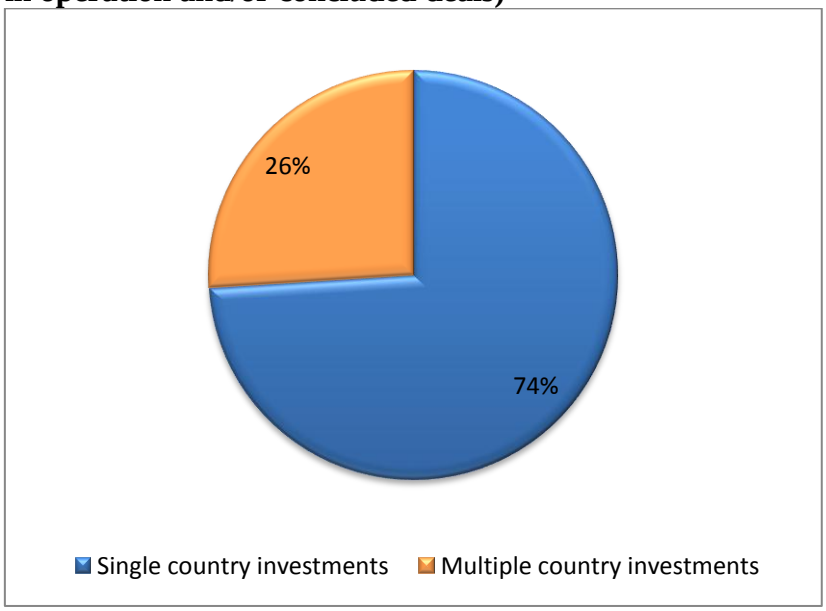


Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

3.2.2 Land acquisitions *by* the EU: investments pursued by multiple investor countries

The investments pursued by the EU countries associated with other countries (both European or non-European) are the focus of the present Section. As previously showed, the investment pursued by more than one investor country account for less than 20% of the land in which land deals have been realised so far at the global level (Figure 15, Section 3.1.3). As regards the EU, the investments pursued by more than one investor country account for 26% of the realised land deals, amounting to over 1.7 Million ha of land (Figure 24).

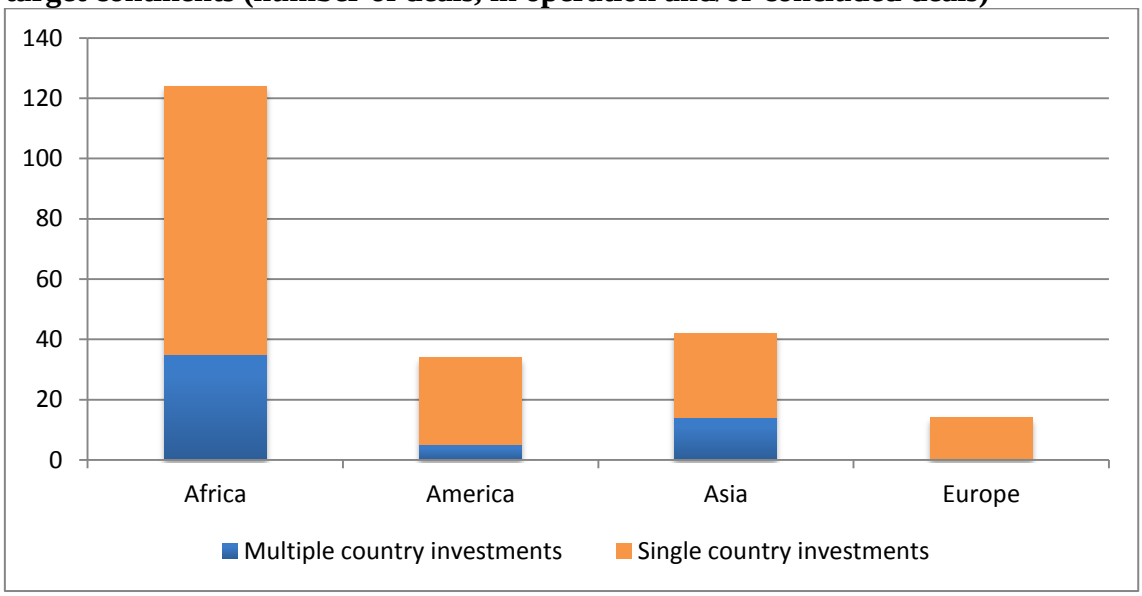
Figure 24. Profile of the investors involving at least one EU country (% of total ha, in operation and/or concluded deals)



Source: v elaboration (Land Matrix dataset as of 16 October 2013)

At the continental level, the number of realised land deals involving multiple country-investors varies quite markedly. In Africa, the most targeted continent by EU land acquisitions, 28% of the realised land agreements involve more than one country. In Asia, this proportion reaches up to 33%, whereas in America it is 15%. Single-country investments account for the largest majority of EU land deals in all the three continents. The land acquisitions pursued by EU member states within the EU territory involve single investor countries only (Figure 25). In absolute terms, the number of agreements realised by multiple investor countries is observed in Africa (34), followed by Asia (14) and Europe (5).

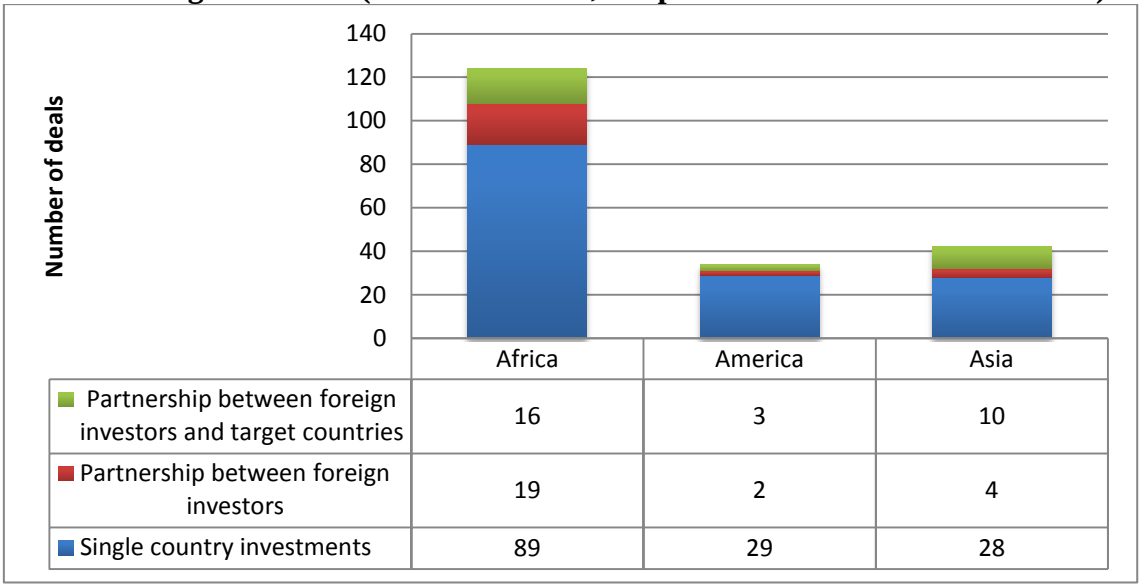
Figure 25. EU multiple country investments VS single-country investments in target continents (number of deals, in operation and/or concluded deals)



Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

Figure 26 shows the number of land agreements pursued by single and multiple groups of investors by continent. It also sheds light on the extent to which EU investments are pursued in conjunction with target countries' national governments. These types of land agreements are referred to as *partnerships between foreign investors and target countries* (green bars), as opposed *to partnerships between foreign investors* only (red bars). At the continent level this proportion varies quite markedly. In Africa, the number of deals pursued in partnership with the national governments of the target countries almost equals the number of partnerships between foreign investor (respectively, 16 and 19 agreements). In Asia, the partnerships between foreign investors and target countries account for the largest share of multiple country investments (10 out of 14); as well as in America (3 out of 5).

Figure 26. Profile of EU multiple country investments in the target continents: partnership between foreign investors and target countries VS partnership between foreign investors (number of deals, in operation and/or concluded deals)

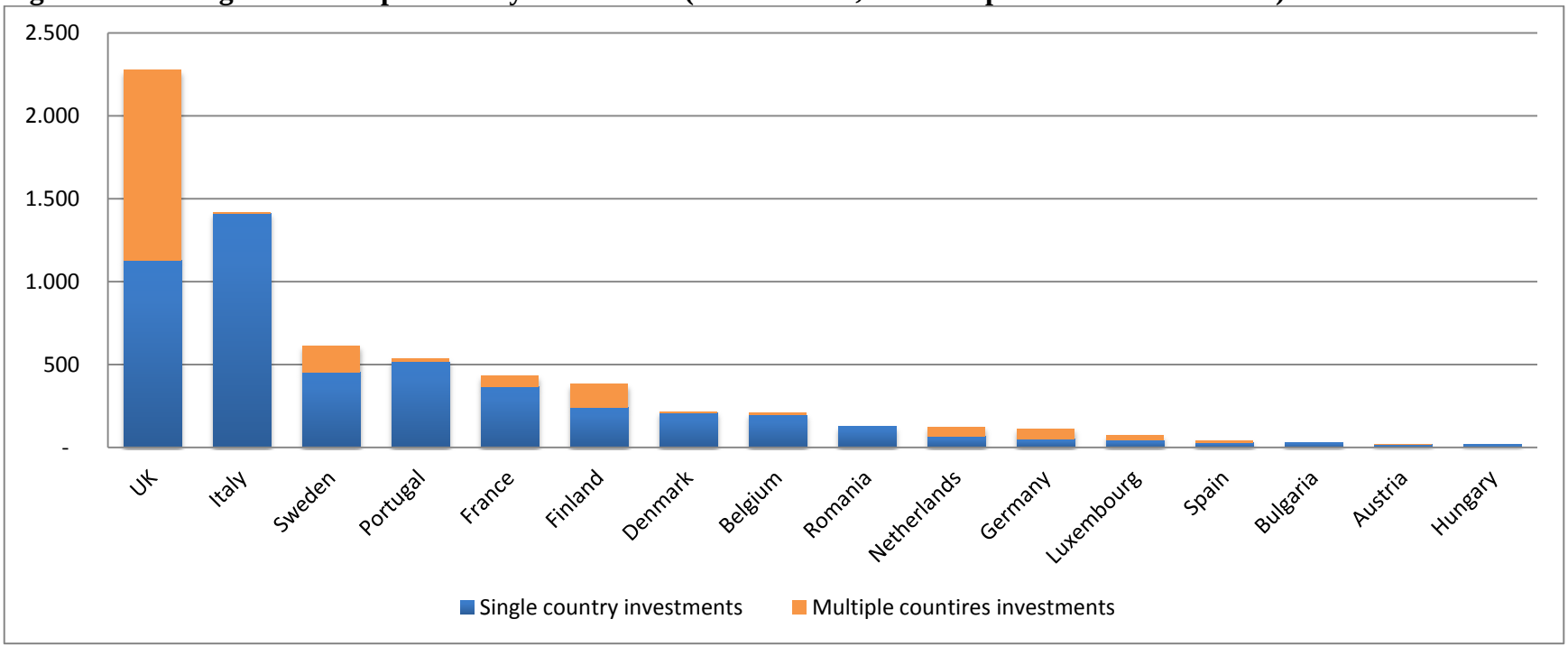


	Africa	America	Asia
Partnership between foreign investors and target countries	16	3	10
Partnership between foreign investors	19	2	4
Single country investments	89	29	28

Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

Figure 27 ranks the EU countries involved in large-scale land acquisitions by the size of farming land involved in the realised land agreements. The UK is ranked as the first EU investor country, if the deals pursued with other investors are included (compare with Figure 22 in Section 3.2.1). The deals pursued in partnership with other investors are 21 (12 of which are in Africa, 9 in Asia) out of 68 total realised land agreements. Production has started in 12 out of 21 land agreements. The partnerships between foreign investor are 13; whereas the investments involving investors in the target countries are 8. The number of land agreements pursued by Italy in partnership with other investors is 2. These investments are based in Mozambique, in partnerships with Spain, the UK and Portugal; and in China, in partnership with the local national government. Italy is also negotiating a deal in Congo in conjunction with the local national government. Multiple country investments are also found in Sweden, Finland, France, Germany and the Netherlands.

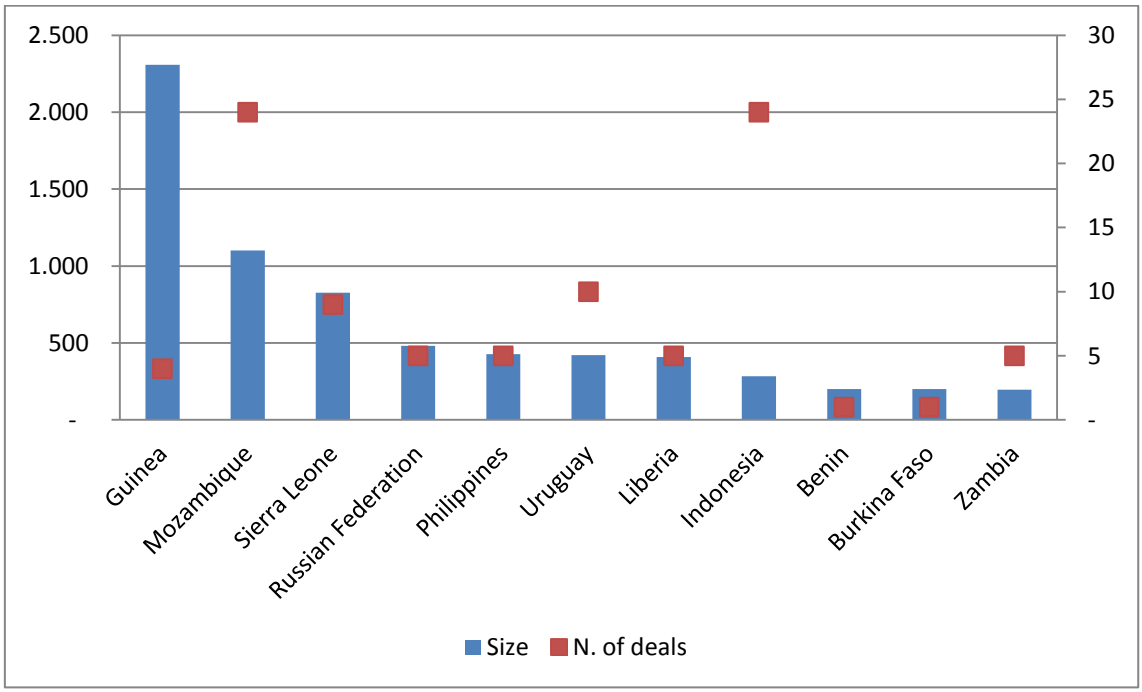
Figure 27. EU single and multiple-country investments (Thousand ha, deals in operation and concluded)



Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

Figure 28 ranks the countries targeted by EU land acquisitions (pursued by both single and multiple country investors) by the total size of acquired land. The investments in these countries account for over 80% of the realised land deals by the EU. Guinea shows by far the larger amount of acquired land (almost 2.5 Million ha) despite the limited number of deals (4). Together with Mozambique and Sierra Leone, Guinea account for 50% of total realised EU land acquisitions.

Figure 28. Countries targeted by EU land acquisitions (total ha, in operation and concluded deals pursued by single and multiple investor countries)



Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

3.2.3 European land acquisitions within Europe

The purpose of this section is to look in more detail at the involvement of EU countries in land acquisitions within the EU territory. This information is particularly interesting if we consider that, as indicated in Section 3.2.1, the second most targeted area (15% of the total land acquired) by single EU investments, after Africa, is the EU territory.

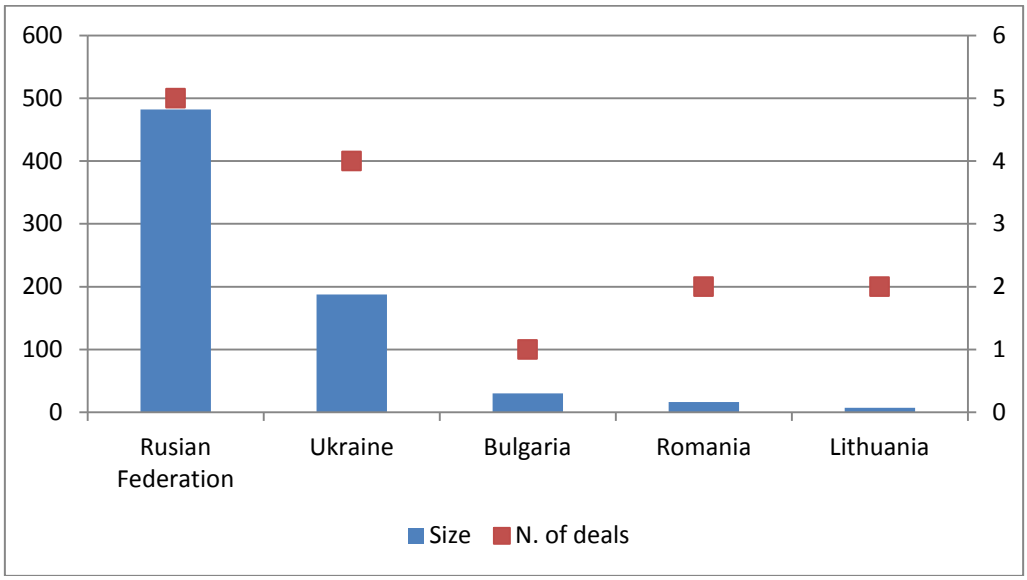
The evidence of large-scale land acquisitions in Eastern Europe and Central Asia is not a new discovery. Within the last years, various studies have focused on the relevance of land grabbing in these areas. For instance, according to a study realized by the World Bank, Central and Eastern Europe and Central Asia regions in 2009 held the fourth place in relation to land grab projects after Africa, Asia, and Latin America (World Bank 2009). Moreover**,** Visser and Spoor (2011) and Visser *et al.* (2012), estimated the

magnitude of land acquisitions in Ukraine and Russia by EU and non-EU investors (among the others Israel, China, UK, Sweden, Germany, Denmark, South Korea) for a total of approximately 4 million hectares between 2006 and 2010.

According to the Food and Agricultural Organization (FAO), only four countries in the world have significant capacity to meet the growing global food demand, three of which are Ukraine, Russia and Kazakhstan (Pearce 2012). Moreover, Ukraine and Russia are currently important providers of feedstock for the EU biofuel market as indicated in tables 8 and 10 in Appendix 1. Furthermore, the expansion of feedstock production for biofuel production in those countries is expected to grow according to the EU biofuel targets as explained in Section 4.1. The importance of Eastern EU territory as food and feedstock for biofuel provider not only globally, but also at the EU level, is emphasised by the number of EU deals and their magnitude in terms of hectares of land acquired. According to our elaborations based on Land Matrix, the EU member states are currently involved in land acquisitions within the EU territory as single investors for a total of 14 deals corresponding to 722,961 ha, and to around 9% of the total acquired land globally by EU. For the majority of land acquisitions, 13 deals in total, corresponding to 714,961 ha, the crop production has already started. While, the negotiation process has been concluded, but production has not started yet on 8,000 ha of land, which refers to 1 deal in Ukraine.

If we look at the most targeted countries by EU investors, Russia occupies the first position with 5 deals amounting to a total of approximately 481,982 ha of land; followed by Ukraine with 4 deals and 187,679 ha; Bulgaria 1 deal and 30,000 ha; Romania 2 deals and 16,100 ha; and finally Lithuania with 2 deals, corresponding to approximately 7,200 ha (Figure 29).

Figure 29. Countries in the European territory targeted by EU land acquisitions (total ha, in operation and concluded deals pursued by single and multiple investor countries)

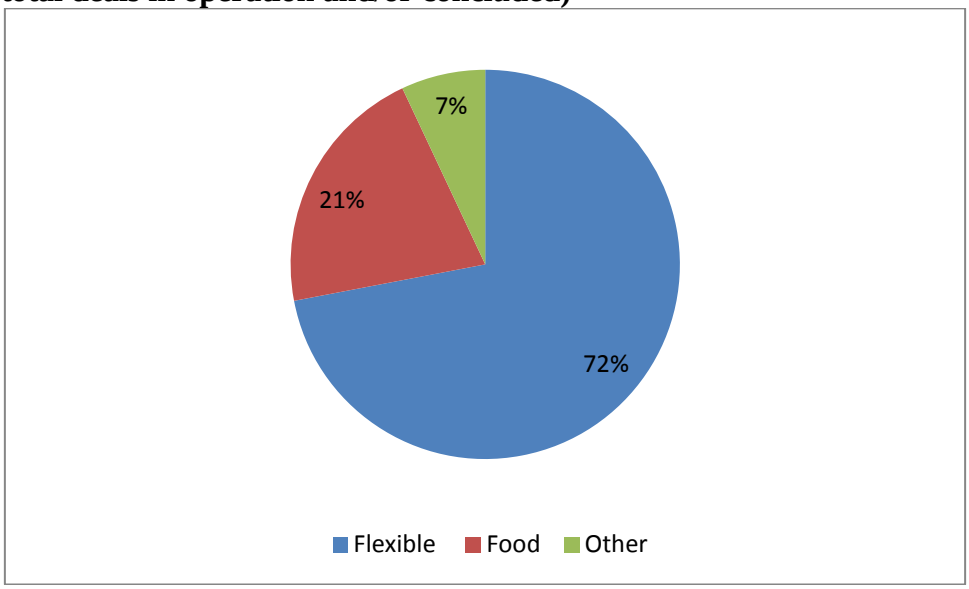


Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

On the contrary, looking at the EU countries involved in land acquisitions within the EU territory, Sweden is ranked as the first EU investor country with 451,700 ha and 5 deals (1 in Ukraine and 4 in the Russian Federation), followed by Denmark with 164,061 and 4 deals (2 in the Russian Federation, 1 in Ukraine and 1 in Romania), France 50,000 ha and 1 deal (in Ukraine), Bulgaria in its own territory (i.e. domestic land grabbing) with 30,000 ha and 1 deal, Finland with 12,000 ha and 1 deal, and finally Germany with 2 deals in Lithuania for a total of 7,200 ha.

Finally, for what concerns the main purposes of the EU land acquisitions within the EU territory, the majority of the deals, approximately 72%, are meant to produce flexible crops, which can be used both for food or biofuel production (such as, among the others, rapeseed, sugar beet, soybean, sunflower), 21% to produce food only (mainly cereals) and 1 deal for other purposes, in this case forestry (Figure 30).

Figure 30. Purposes of EU land acquisitions within the European territory (% of total deals in operation and/or concluded)



Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

4. What drives the EU land acquisitions?

4.1 The role of energy and agricultural policies

As stated in the introduction, a number of different factors have been highlighted in the literature as drivers for the increased demand for land by EU member states, such as energy security and food crisis. European involvement in land grabbing is first due to the policies of both the EU and individual Member States, which are directly and indirectly stimulating foreigner land acquisitions, especially in relation to food and biofuels production in the global South (Cotula *et al*. 2008; Cotula 2012; Borras and Franco 2011; EuropAfrica 2011; Franco *et al*. 2010; Liu *et al.* 2013; Grain 2013; Graham *et al.* 2011). In relation to energy, European policies have been in the last years the key drivers for the expansion of the production and use of renewable energy by all Member States (MS). By 2020, 20% of energy used in the EU and 10% of each member state's transport fuel must come from renewable sources (EU Renewable Energy Directive – RED 2009/28/EC). The stated reasons behind EU policies for the promotion of renewable energy and therefore biofuels are mainly three (Lamers *et al.* 2011): (i) environmental protection (i.e. greenhouse gas savings); (ii) energy security (i.e. reduce EU dependency on fossil fuels and imported energy); (iii) to promote inclusive green

growth (i.e. to boost the renewable energy industry to encourage technological innovation and employment in the EU).

Since various concerns have been raised regarding the sustainability of biofuels productions (especially in relation to first generation biofuels[19]), as well as the conflict with food crops (FAO 2008, 2013), EU policies have introduced specific sustainability criteria. These criteria refer to greenhouse gas savings, measures to protect land with high carbon stock and biodiversity value, agro-environmental practices, fuel quality standards (see Box 3).
Moreover, an Indirect Land Use Change (ILUC) policy proposal has been recently approved by the Commission with the objective to reduce the greenhouse gas emissions from land use changes induced by the expansion of biofuels, especially in relation to forests and pristine lands converted to cropland (Al-Riffai *et al.* 2010; Ecofys 2012). In addition, further legislation recommends a limit on the use of crop-based biofuels at only 7% of total EU transportation energy and after 2020 biofuels should be subsidized only if they lead to substantial greenhouse gas savings and are not produced from crops used for food and feed (Dunmore 2012). While a large majority of MS reached already or exceeded their 2011/2012 minimum trajectory target, a large number of MS need to speed up Renewable Energy Sources (RES) developments in order to fulfil their 2020 targets, especially for what concerns the 10% share of RES-T (renewable energy resources applied in transport) (Hamelinck *et al* 2012).

Apart from a few subsidy schemes on electric vehicles and battery charging infrastructure, policies and instruments implemented by MS to reach RES-T targets are almost completely aimed at biofuels deployment (Hamelinck *et al* 2012). The global market for biofuels depends mostly on consumption and production mandates, incentives (i.e. promoting flex-fuel vehicles or tax exemptions), investment supports, feedstock support, tax incentives and trade related measures (i.e. import or export tariffs) (for a detailed overview of the global biofuels market see Lamers *et al.* 2011). Globally, biofuels (mostly supported by blending mandates) received subsidies totaling $24 billion in 2011, which are expected to increasing to $46 billion in 2020 and $59 billion in 2035, with the vast majority going to conventional biofuels in 2035 (IEA 2012). The European Union, United States and China account for the bulk of renewable subsidies, today 85%, and in 2020 is expected at 77% (IEA 2013). As a consequence of the implementation of targets and policies by EU and Member States, biofuels production and consumption in EU have increased in the last years, with an increase in

[19] Sugar and starch crops (for ethanol) and oilseed crops (for biodiesel) is generally referred to as first-generation biofuels. Second generation biofuels are produced using biomass consisting of the residual of food crops such as stems, leaves and husks, as well as other non-food crops, such as switchgrass, grass, jatropha, algae, lignocellulosic biomass, industry waste (woodchips, skins, pulp).

the period 2002-2011 of 12,270 and 17,308 thousands of tonnes in production and consumption, respectively (Table 5).

Table 5. Biofuels production, import, export and consumption - EU (27 countries) (thousands of tonnes)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Primary production	1380	1862	3272	5326	9346	14035	14640	14828	16362	13650
Imports	24	24	168	571	1053	1845	3668	4526	5995	7813
Exports	89	141	937	1327	2685	3048	2940	2047	2785	2832
Consumption	1315	1745	2500	4558	7702	12669	15238	17313	19554	18623

Source: Authors' elaboration (Eurostat, 2013. Supply, transformation, consumption - renewables (biofuels) - annual data [nrg_1073a])

Furthermore, according to the OECD-FAO agricultural outlook, from 2012 to 2020 the EU production and consumption of biodiesel and ethanol will increase of about 55 and 56%, and of 91 and 94%, respectively. The same data and projections show that the gap between production and consumption will also increase by 2020, predicting a raise on EU imports of biofuels from third countries (OECD-FAO Agricultural Outlook 2012-2021). According to the EU report on progress on renewable energy use, first generation biofuels will be the predominant energy source over the period to 2020. Second generation biofuels (lignocellulosic bioethanol, biomass to liquid) and electric vehicles are expected to make only a small contribution by 2020 (EU COM 2011). On the contrary, looking at the period over 2020 the share of renewable energy in the transport sector in EU is estimated at 80% by 2050, from high shares of both renewable electricity and second-generation biofuels (for a detailed review of different renewable energy scenarios at the global and EU level see REN21 2013).

In 2010, the land used for EU-consumed biofuels is about 5.7 Mha, of which 57% is within the EU and 43% from outside Europe (Hamelinck *et al.* 2012). From 2000 to 2010 the additional land use of EU biofuels production has been estimated to be 2.2 Mha, with an increase of 1.1 from 2008 to 2010. Approximately 40% of the feedstock used to satisfy EU biodiesel consumption in 2010 comes from third countries, of which 30% from developing countries. While, in the case of bioethanol, the feedstock used from third countries is approximately 20% of the total, of which 13% from developing countries. In terms of feedstock used, most of the EU produced biodiesel in 2010 was produced from rapeseed (56%), followed by soybean (13%) and palm oil (9%) (Hamelinck *et al.* 2012: 202). The most important feedstock for biodiesel is rapeseed originating from the EU, followed by Argentinean soy, Indonesian and Malaysian palm oil, and rapeseed from Canada and Ukraine. More than half of the EU produced ethanol is on basis of starch crops (30% from wheat, 23% from maize and smaller contributions

from barley and rye). Sugar beet represents another 30%. The EU consumed bioethanol is mainly produced from EU feedstock, with only small shares of wheat and maize originating from Switzerland, Ukraine and a few other countries, and sugar cane and maize play a role via the bioethanol supplying countries due to the import of ethanol, mainly Brazil and the US Hamelinck *et al.* 2012: 202) (for details on the ultimate origin of feedstock for EU consumed biofuels the reader is referred to Tables 2 and 4 in the Appendix 1).

A study carried out by the International Food Policy Institute - IFPRI in 2011 on the land use effects of the EU renewable mandate (achieving 8.6 percent consumption of ethanol and of biodiesel in 2020), has also shown that, globally, the additional mandate will lead by 2020 to an increase in cropland area between 1.73 (with unchanged existing import tariffs on biofuels by 2020) and 1.87 Mha (assumption of full, multilateral trade liberalization in biofuels, contingent protection on US biodiesel remains). Moreover, while cropland extension will remain under 6% in the case of Europe under both scenarios, Latin America, mainly Brazil, CIS (Commonwealth of Independent States)[20] and sub-Saharan Africa will be the most affected regions (Laborde 2011)[21]. If one looks at the trade effects, EU imports of rapeseed, palm oil and soybean will increase, while imports of wheat and corn will increase only without trade liberalization. Moreover, trade liberalization will lead to an increase in sugar cane ethanol imports and a decrease in maize imports (Laborde 2011).

Currently, EU members are the main consumers and producers of biodiesel and significant consumers of ethanol (see appendix 1 for details on the biofuel market in Europe). Due to the expected increase of EU biofuels consumption and imports from third countries, and the fact that most of the consumption is predicted to be satisfied by first generation biofuels by 2020, an increase of EU imports of feedstock from third countries are likely to happen in the period 2011-2021 (as indicated by the estimation of the IFPRI report commented above). This trend could be altered in case of significant changes in EU biofuels sustainability requirements, such as for instance with the recent inclusion of ILUC policies (as of May 2014) and reduction in subsidies and use of food

[20] Regional organization formed by Post-Soviet states: Armenia; Azerbaijan; Belarus; Estonia; Georgia; Kazakhstan; Kyrgyzstan; Latvia; Lithuania; Moldova; Russia; Tajikistan; Turkmenistan; Ukraine; Uzbekistan.

[21] In terms of crops change and under the current trade scenario, the increase in the demand of biodiesel will lead to an increase of oilseed production, mostly rapeseed and sunflower, and a decrease of cereals (especially in EU). The latter replaced by rapeseed. The main effect of the increase in the ethanol demand will lead to an extension of the EU sugar beet production. On the contrary, in the case of trade liberalization, the world (mainly Brazil) expands sugarcane production and EU can grow 10% more rapeseed, taking land away from sugar beet and cereals. Moreover, most of the land interested by cropland extension is pasture and managed forest, followed by savannah and grasslands and primary forest (Laborde 2011).

crop-based biofuels, as discussed above. Even though it is still too early to appreciate the effects of the new policy requirements, this policy could severely limit growth of imports to the EU of ethanol and biodiesel as the majority of EU transport energy already comes from food crop-based biofuels; however, it may also lead to faster development of large-scale advanced biofuels trade (Lamers *et al.* 2011). Yet, predictions over the developments and use of second-generation biofuels by 2050 are still highly uncertain, since it will depend strongly on specific policies, trends in fossil fuel prices, investments and developments in technologies and their application (REN21 2013).

In addition to energy policies, EU agricultural policies have been highlighted in literature as one of the main drivers of EU land acquisitions in the global South. Europe is the continent more dependent on the import of "virtual" land for food and forestry productions all over the world. It has been estimated that almost 60% of the land required to satisfy EU's demand of agricultural and forestry products come from third countries outside Europe (Friends of the Earth Europe 2011; Witzke and Noleppa 2010). It has also been estimated that the EU livestock industry imports around 75% of its feedstock (Liu *et al.* 2013). The Common Agricultural Policy (CAP) supports the imports of food commodities from third countries in various ways: (i) agricultural trade liberalization; (ii) increase in the competitiveness of the agribusiness sector (mainly through the access of cheap raw material, especially for the livestock industry); (iii) declining of the incentives on agricultural production (FIAN 2012; Witzke and Noleppa 2010). Moreover, the EU's "Everything but Arms Agreement" gives all Least Developed Countries (LDCs) full duty free and quota-free access to the EU for all their exports with the exception of arms and armaments, which can generate strong incentives for land grabbing.

In sum, the predicted increase of EU biofuel import by 2020 driven by EU renewable policies and the need of feedstocks for the production of first generation biofuels are likely to be associated with an increase in EU land acquisitions for biofuel production by 2020. However, this trend could be inverted in the long run (by 2050), depending on the development and implementation of second-generation biofuels and the use of advanced technology in the EU transport sector. Moreover, EU agricultural trade liberalization is likely to play an important role in increasing the imports of agricultural and forestry products and therefore EU land acquisitions from third countries.

Box 3. European policies on biofuels

Different European Directives refer to the biofuels use in Europe, such as the Fuel quality Directive 98/70/EC, the Biofuel Directive 2003/30/EC, the Renewable Energy Directive 2009/28/EC.

The Fuel quality Directive 98/70/EC sets environmental specifications for fuels with a 5% limit on ethanol blending. At the same time, two amendments to Directive 98/70/EC have introduced a 10% blend for ethanol and a mandatory target to achieve by 2020 a 6% reduction in the greenhouse gas intensity of fuels used in road transport and non-road mobile machinery.

The Directive 2003/30/EC promotes the development of biofuels market in the EU. To encourage biofuel use, in competition with less costly fossil fuels, the Directive sets a voluntary "reference target" of 2% biofuel consumption (on the basis of energy content) by 2005 and 5.75% by 2010. It obliges Member States to set national indicative targets for the share of biofuels, in line with reference percentages of the Directive, although it leaves them free to choose a strategy to achieve these targets.

The Renewable Energy Directive 2009/28/EC (and the relative amendments), sets the binding target for the use of renewable energy in the transport sector at 10% by 2020 and indicates specific strategies and criteria for the promotion of sustainable biofuel productions. According to this directive MS have to report on compliance with environmental and social sustainability criteria. Minimum GHG reduction from the use of biofuels should be, 60% for installations operating after 1st July 2014, 35% until 31 December 2017 and 50% from 1st January 2008 for installations operating on or before 1st July 2014. For what concerns impacts on land, biofuels should not come from carbon rich and biodiverse land, a bonus of 29 g CO2/MJ will be given for biofuels from degraded/contaminated land, and biofuels from waste, residues, non-food crops (i.e. second-generation biofuels) will count twice on RES transport targets. Furthermore, the Commission is obliged to report, every two years, to the European Parliament about national measures taken to respect sustainability criteria, soil, water and air protection, in respect of both third countries and Member States that are a significant producer of biofuels consumed in the European Community boundaries. Moreover, the Commission has also to report on the impact on social sustainability in the Community and in third countries of increased demand for biofuel, as well as on the impact of Community biofuel policy on the availability of foodstuffs at affordable prices, in particular for people living in developing countries, and wider development issues.

4.1.1 Responsible investments in agricultural land and EU recommendations

The controversies associated with large-scale land acquisitions by foreign investors has raised questions on how to promote responsible investments in agriculture, how to

develop land administration systems and institutions that are transparent, accountable and accessible, while preserving the more vulnerable layers of the population. Over the past few years, the issue of responsible investments in agriculture has been explored by a number of analytical reports, inter-governmental and policy documents. These include, among others, the FAO Voluntary Guidelines on the Responsible Governance of Tenure (FAO 2012); the "Declaration on land issues and challenges in Africa" adopted by the Heads of State of the African Union in 2009; the report "Development Policy Stance on the Topic of Land Grabbing – the Purchase and Leasing of Large Areas of Land in Developing Countries" (2009) by the German Federal Ministry for Economic Co-operation and Development; the roundtable "Promoting Responsible International Investment in Agriculture" held by the Government of Japan, UNCTAD, World Bank, Food and Agriculture Organisation and the International Fund for Agricultural Development in 2009; a paper by the UN Special Rapporteur (UNSR) on the Right to Food, Olivier de Schutter, containing 11 "recommendations" to investors and targeted countries. These initiatives aim to promote a number of fundamental principles towards more responsible investments, which have been summarised in Box 4. Three instruments by OECD have also been identified as relevant for promoting responsible agricultural investments: the Policy Framework for Investments; the OECD guidelines for Multinational Enterprises; the Risk Awareness Tool for Multinational Enterprises in Weak Governance Zones[22].

The EU has encouraged Member States to adopt the FAO Voluntary Guidelines on the Responsible Governance of Tenure (FAO 2012). Moreover, the EU calls for consultation of civil society and participation of parliaments and elected representatives of local and regional authorities to ensure transparency of contract negotiations to prevent negative effects on smallholder and medium-scale farmers and to local, regional and national food security. In addition, the EU encourages to protect land use rights of small local farmers, especially in countries where land acquisitions has happened at an alarming extent over the last years, such as in Africa (EU policy framework, 2011).

However, a part from the above voluntary-based recommendations, specific EU directives and legally binding measures, as well as a EU recognized definition of sustainable or responsible land investments are still missing to ensure the adoption of responsible guidelines on land acquisitions by all member states (GRAIN 2012).

Finally, with respect to biofuels production, the Renewable Energy Directive (RED) establishes that bilateral and multilateral agreements with third countries have to comply with sustainability criteria (see box 3). Moreover, when agreements are concluded a special consideration should be given to issues of basic ecosystem services

[22] For further details the reader is referred to OECD (2010).

conservation, soil, water and air protection, indirect land-use changes, the restoration of degraded land, the avoidance of excessive water consumption in areas where water is scarce, ensure the availability of foodstuffs at affordable prices, in particular for people living in developing countries, the respect of land-use rights and the implementation of the conventions on the International Labour Organization (EU Renewable Energy Directive – RED, 2009/28/EC). However, specific methods to assess the social sustainability of land acquisitions for biofuels production have not been until now developed. Therefore, it is not clear if and how the European Commission is able to take measures with respect to social unsustainable land agreements.

Box 4. Principles for responsible agro-investments

Respecting land and resource rights: existing rights to land and associated natural resources are recognized and respected.

Ensuring food security: Investments do not jeopardize food security but strengthen it.

Ensuring transparency, good governance, and a proper enabling environment: processes for acquiring land and other resources and then making associated investments are transparent and monitored, ensuring the accountability of all stakeholders within a proper legal, regulatory, and business environment.

Consultation and participation: all those materially affected are consulted, and the agreements from consultations are recorded and enforced.

Responsible agro-investing: investors ensure that projects respect the rule of law, reflect industry best practice, are economically viable, and result in durable shared value.

Social sustainability: investments generate desirable social and distributional impacts and do not increase vulnerability.

Environmental sustainability: environmental impacts of a project are quantified and measures are taken to encourage sustainable resource use while minimizing and mitigating the risk and magnitude of negative impacts.

Source: Deininger et al. (2011: xxvii)

4.2 Food vs. Fuel

This section describes the purpose of all the land deals realised by the EU countries and reported as "agricultural". The analysis is conducted for the concluded, in operation and intended land deals. It is original in that it is to our best knowledge, the first analysis on EU land acquisitions based on crosscheck of sources of information on the actual final use of the acquired land rather than on the type of crop grown. Many crops can be defined in fact as *flexible* as they can serve both food and energy-related purposes. This is particularly important given the wide presence of crops such as oil palm with a variety of different uses (energy, food and industrial).

Food and biofuel productions are considered by the literature on land grabbing as the main purposes of foreign land acquisitions globally. Considering the EU land acquisitions and referring to our classifications as explained in the Methodology section, flexible crops are the first reason for the deals in operation accounting for 46% of the total, followed by agro-fuel 23% and food 22%. In relation to the concluded deals, agro-fuel is the first reason of the deals with 39% of the total, followed by flexible crops with 28% and food with 18%[23]. However, in the case of concluded deals the amount of land used for flexible crops is higher than in the case of agro-fuel and food.

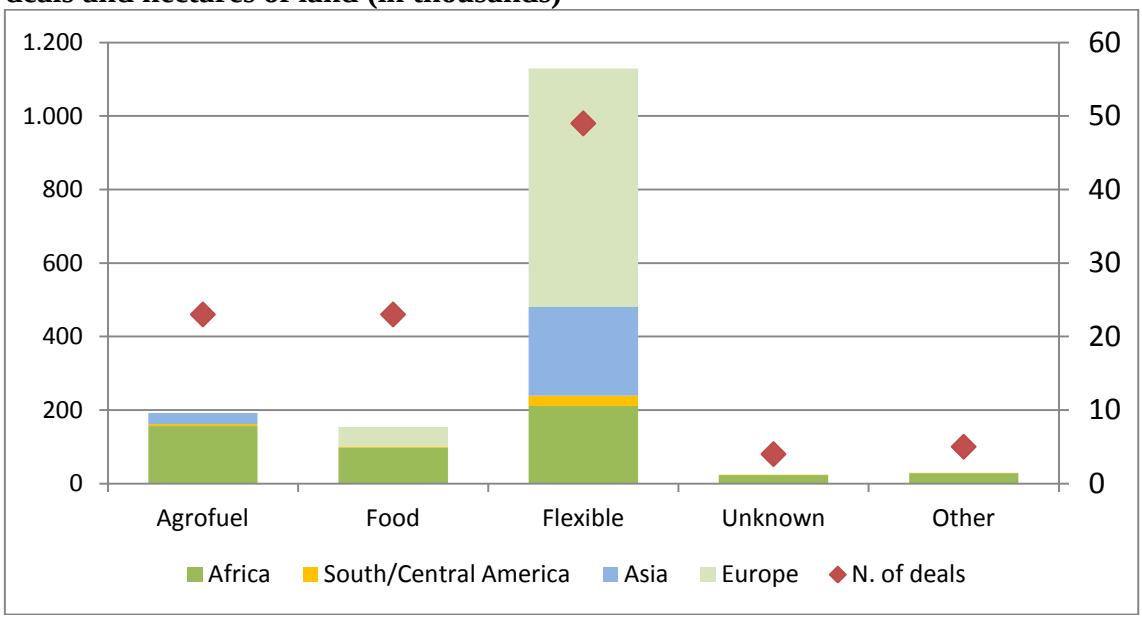
In the case of flexible crops it is difficult to distinguish one single final use; however looking at the land deals in operation, we have seen that among the 48 deals classified as flexible, 28 are meant to produce food and\or agro-fuel and 20 also refer to industrial uses (this is the case for instance of the production of oil palm which can be associated to multiple uses such as, biofuel, food, cosmetics, and other industrial uses or the case in which the land is used to grow both rubber, mainly used for industrial production, and oil palm or other biofuel crops). Moreover for the deals in operation, flexible crops are mainly grown within the European territory, where the final use is above all for food and\or biofuel production. Other industrial uses are not involved in this case (for more detail on the main purposes of EU land acquisitions within the EU territory the reader is referred to section 3.2.3). Other industrial uses are instead much common in Asia and Africa with rubber and oil palm plantations, for obvious reasons of more favourable climatic conditions.

The figures below are also useful to confirm that the information regarding deals in operation are much better than in cases with different implementation status (e.g. intended or concluded deals not yet in operation). The number of hectares in operation for which no information is available is in fact very limited, as compared with deals reported as concluded, meaning that the distinction is quite useful to understand the real scope of the phenomenon. This fact also highlights the necessity to regularly monitor the changing dynamics of the phenomenon of international land deals because moving from acquisition to actual use may imply time and investments. The distinction also allows one to notice that Africa is going to be the place for production of flexible crops,

[23] This percentage includes both deals whose purpose is "food" and "food and forestry".

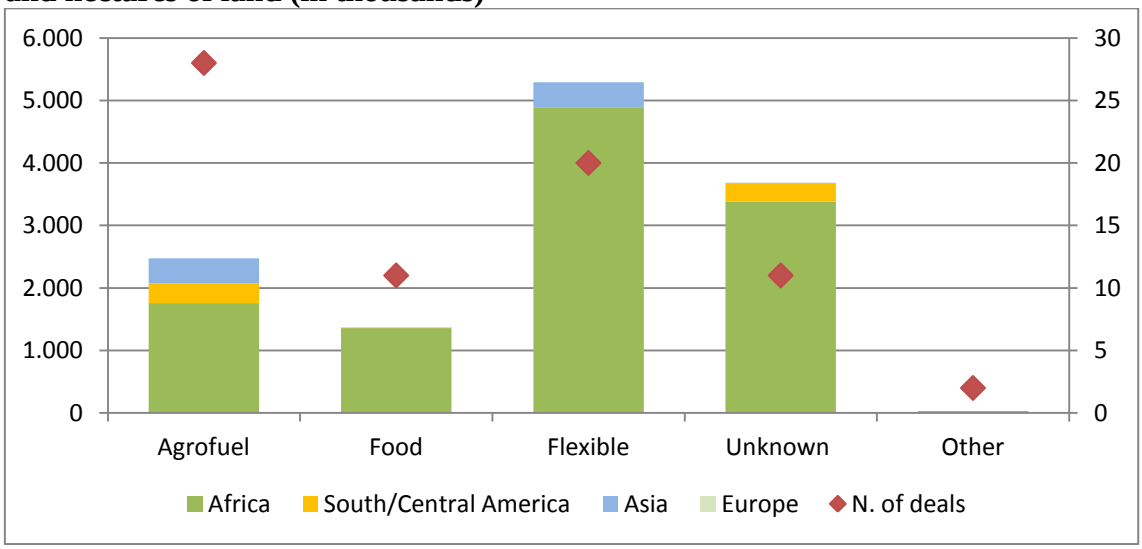
if the deals concluded will eventually result in operational site. Africa, again as we have shown in our previous analysis, is the main target for EU countries' investments in land: much land has been involved in many deals, and the lack of information regarding the purpose of such acquisitions suggests that there is not enough transparency on the one hand, and that there is a real rush for land that might be kept idle for time, on the other. A further remarks is noteworthy: the trend toward expansion of land acquisition by the EU, under the pressure of demand for biofuels is remarkable, as we can see in the table reporting the intended land deals, showing us that agro-fuel is driving further demand not only in Africa but also in Asia. One last observation concerns the land used explicitly for food production: it is mainly located in Africa, with a tiny share in Europe, it is limited if compared with other uses, and it could grow in the future if intended deals for food will become operational.

Figure 31. Purposes of land deals in operation for targeted regions, number of deals and hectares of land (in thousands)



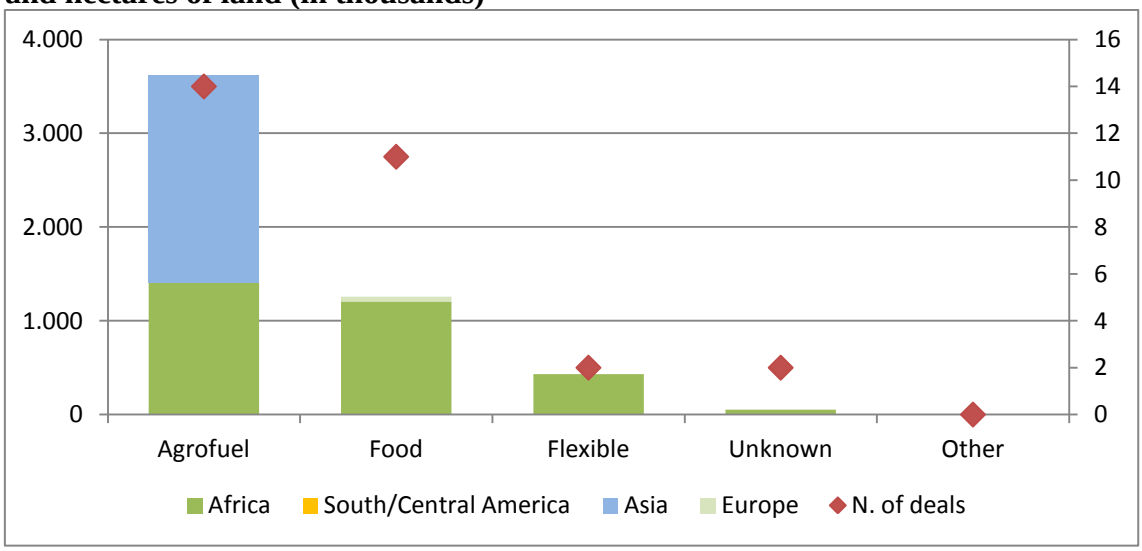
Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

Figure 32. Purposes of concluded land deals for targeted regions, number of deals and hectares of land (in thousands)



Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

Figure 33. Purposes of intended land deals for targeted regions, number of deals and hectares of land (in thousands)



Source: Authors' elaboration (Land Matrix dataset as of 16 October 2013)

4.3 The role of land and water resources

In the literature on the potential consequences of land acquisitions by foreign investors in developing countries, land and water are considered the most vulnerable resources in terms of overexploitation, especially in the target countries where their level is already at risk (Rulli *et al.* 2012). Many of the areas targeted by global and EU land acquisitions

are faced with economic water scarcity, which, as shown in Section 1.1, generally occurs in conjunction with malnutrition. This is particularly the case of Sub-Saharan countries.

This section presents an analysis of water and land availability in relation to both the most targeted countries by EU investors, and the main EU investors. This analysis has the purpose to gain insights on the potential impacts that EU land acquisitions could have on land and water resources of the targeted countries, as well as to discuss the potential drivers of EU land acquisitions in terms of water and land scarcity of the investors' countries of origin. In addition, we look at the main socioeconomic characteristics and the level of development of the targeted countries.

Two indicators are used to analyse land and water scarcity:

1) The *index of suitable land in use*, which is defined as the ratio between the cultivated land (arable land and land with permanent crops) and the very suitable, suitable or moderately suitable land available in each country for all crops excluding fodder for mixed level of input and under rainfed and/or irrigation conditions[24] (FAO 2010; FAO 2012). This index thus identifies the amount of land more suitable for agriculture already in use in a given country. When the amount of cultivated land is higher than suitable land, the country is using marginal land or land not suitable for cultivation (values >1). On the contrary, when the amount of cultivated land suitable for agriculture is lower than suitable land (values <1), there is still suitable land available for agricultural purposes. As we shall see, this is the case of most of the countries targeted by large-scale land acquisitions, both by the EU and at the global level.

2) The *water availability index*, which identifies the water available in the different countries under consideration on the basis of the local availability of 1,700 m^3 per capita per year, considered as a threshold for water stress as identified by Falkenmark (1989). When per capita water availability is below (above) this threshold, the country faces (does not face) water stress. Data on water availability by country are provided by FAO AQUASTAT (2014). Although this index does not consider soil water (due to data limitations) which is, as shown in Section 1.3 Box 2, a pivotal source of water for agricultural production globally, it is deployed in order provide useful information for comparing the endowments and potential impacts of land acquisitions in the main targeted countries. If we added green water, in some cases water availabilities would double[25].

Figure 34 shows the water available and the suitable land already in use in the countries targeted by EU investments. The countries included in the Figure account for 80% of the area involved by concluded and/or in production deals. The figure offers useful insights on the relationship between natural resource use and EU land acquisitions..

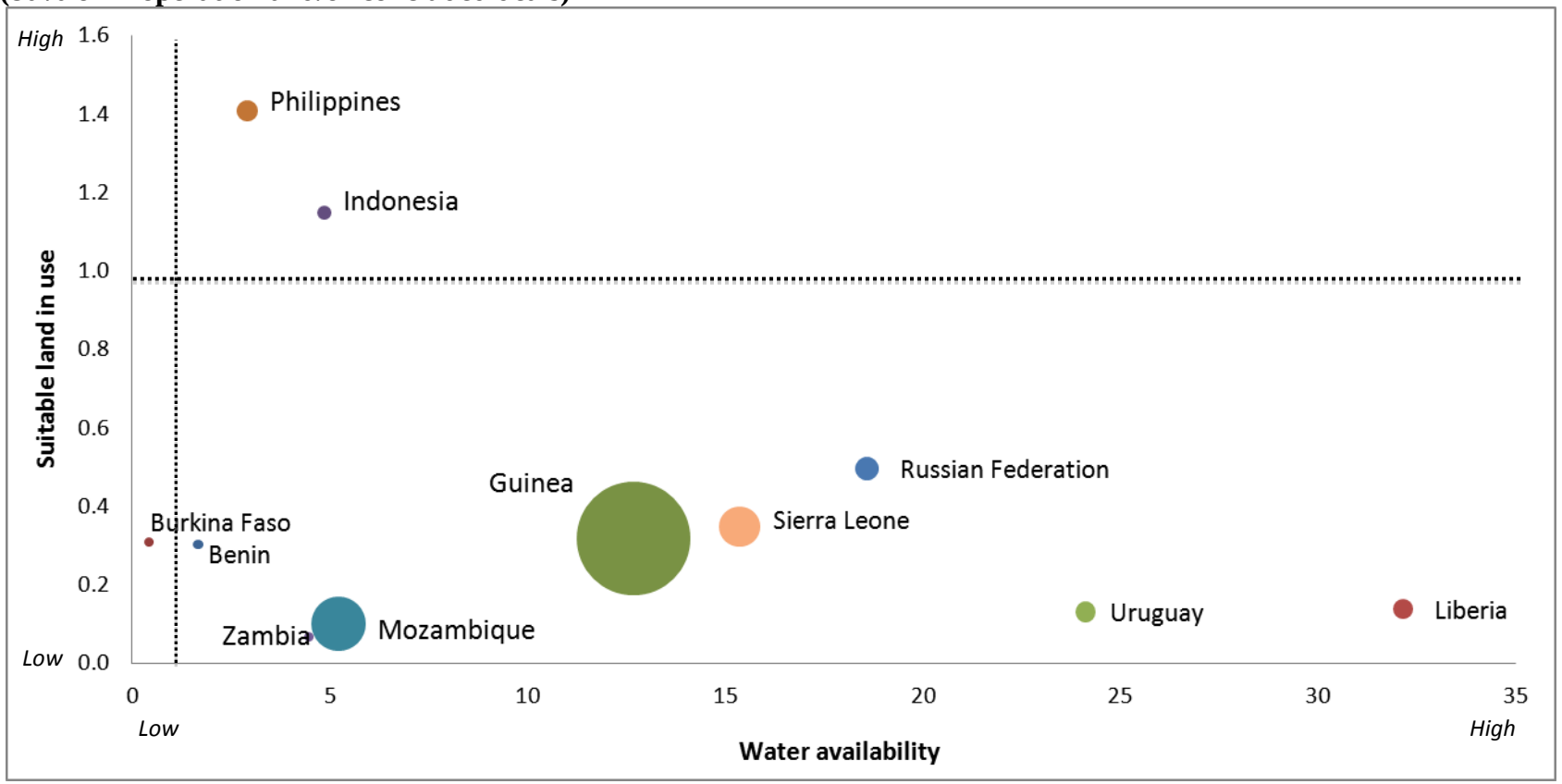
[24] According to the FAO definition land suitability is the fitness of a given type of land for a defined use (for more detail on land suitability classifications see FAO 1976). The index used in our analysis excludes forests.

[25] For a detailed discussion on green and blue water availabilities the reader is referred to Gerten *et al.* (2011).

Almost all of the countries targeted by EU land acquisitions have a large amount of land of good quality, which has not been exploited yet. Most of them show in fact a proportion of agricultural suitable land already in use below 40%. The Philippines and Indonesia are exceptions. For these countries in fact the suitable land is less than the cultivated land, indicating an overexploitation of the land suitable for cultivation. Therefore, even though the portion of land acquired by EU investors in those countries is small compared with the land acquired in other countries (such as Guinea, Mozambique and Sierra Leone), it is important to highlight that, due to the suitable land constraints, further land acquisitions are likely to result in the exploitation of marginal land or even forest land, which might in turn bring about huge environmental impacts due to deforestation. Cases of deforestation related to land acquisitions for biofuel productions by oil palm plantations have been already reported in Indonesia and Malaysia (World Watch Institute 2009; Borras and Franco 2011).

Generally speaking, the amount of land of good quality and water availability is generally larger in Africa compared with the other targeted countries by EU land acquisitions. Two African countries, namely Burkina Faso and Benin show relatively low levels of water availability. The former below the identified threshold of water scarcity (1,700 m3 per capita per year), the latter is above the threshold but water availability is dramatically lower compared with the rest of the countries. Again, a further increase of land acquisitions for intensive agricultural production for food or biofuel in those countries could result in negative environmental and social impacts related to the already limited water availability. It is noteworthy to say, however, that *economic* water scarcity is found in almost all the rest of the African countries involved in EU land acquisitions. Nevertheless, if land acquisitions provide better jobs and economic opportunities for the local population, economic water scarcity could also be reduced. However, this assumption should be tested with specific case studies at the local level in the target countries, since various studies on land grabbing have also showed that most of the times land deals are associated with land evictions and poor local development (Vermeulen and Cotula 2010). Finally, the most targeted country by EU land acquisitions, Guinea shows high levels of both water availability and suitable land, and two countries Liberia and Uruguay show an abundance of both land suitable for cultivation and water resources.

Figure 34. EU land acquisitions (ha of land) in relation to land suitability and water availability in the most targeted countries (80% of in operation and/or concluded deals)



Note: The vertical axis displays the suitable land already in use. A high value indicates less land available of good quality. Value above 1 indicates an overexploitation of suitable land. The horizontal axis displays the water availability indicator. A high value indicates a country's water availability above the identified threshold of water stress. A value below 1 indicates water stress. The land acquired by EU investors for each country is represented by the size of the bubble (in operation and/or concluded deals). *Sources: Authors' elaboration (FAO 2010; FAO 2012; Land Matrix 2013; FAO AQUASTAT 2014).*

Moreover, if we look at the level of human development of the 11 most targeted countries identified above (Figure 34), we can see that 64% of them show very low levels of HDI; and only 2 have a high-very high HDI (Table 6). Three of the countries with the lower HDI, namely Sierra Leone Guinea, and Mozambique are also the most grabbed countries by EU in terms of hectares of land acquired.

Table 6. Level of Human Development Index (HDI)[26] in the most targeted countries (80% of in operation and/or concluded deals) by land acquisitions from EU investors.

Very Low	HDI	Low-Medium	HDI	Medium-High	HDI	High-Very High	HDI
Zambia	0.448	Indonesia	0.629	Philippines	0.654	Uruguay	0.792
Benin	0.436					Russian Federation	0.788
Liberia	0.388						
Sierra Leone	0.359						
Guinea	0.355						
Burkina Faso	0.343						
Mozambique	0.327						
64%		**9%**		**9%**		**18%**	

Note: According to the latest Human development Report by the UNDP, for 2012 the classification of the HDI is based on the following classes: Very high human development=0.905; High human development=0.758; Medium human development=0.640; Low human development=0.466; Values below 0.466 are classified in this table as very low human development. *Source: Authors' elaboration (UNDP 2013).*

Figure 35 investigates the relationship between natural resource endowments in the major European and global investors (which accounts for the 80% of the total acquired land globally of the deals in operation and/or concluded) in order to understand the extent to which land and water scarcity can be considered as drivers for land acquisitions. EU countries are marked in red.

Three groups can be identified on the basis of the availability of land and water resources[27]:

- **Resource-abundant countries.** These countries include Canada, Brazil, Liberia, Cambodia, Argentina, Finland, Guinea but also Sweden and Austria. Most of the developing countries in this cluster are involved in land acquisitions both as investors and investee. The size of realised investments is relatively low with respect to other investors.

- **Moderately resource-abundant countries.** This cluster includes all the EU countries but Sweden, Austria, Denmark and Spain. The USA, the biggest investor at the global level, is also in this cluster. Factors other than natural resource deficit, including policy-driven interests are argued to be the drivers of

[26] Data refer to the year 2012 (UNDP 2013).

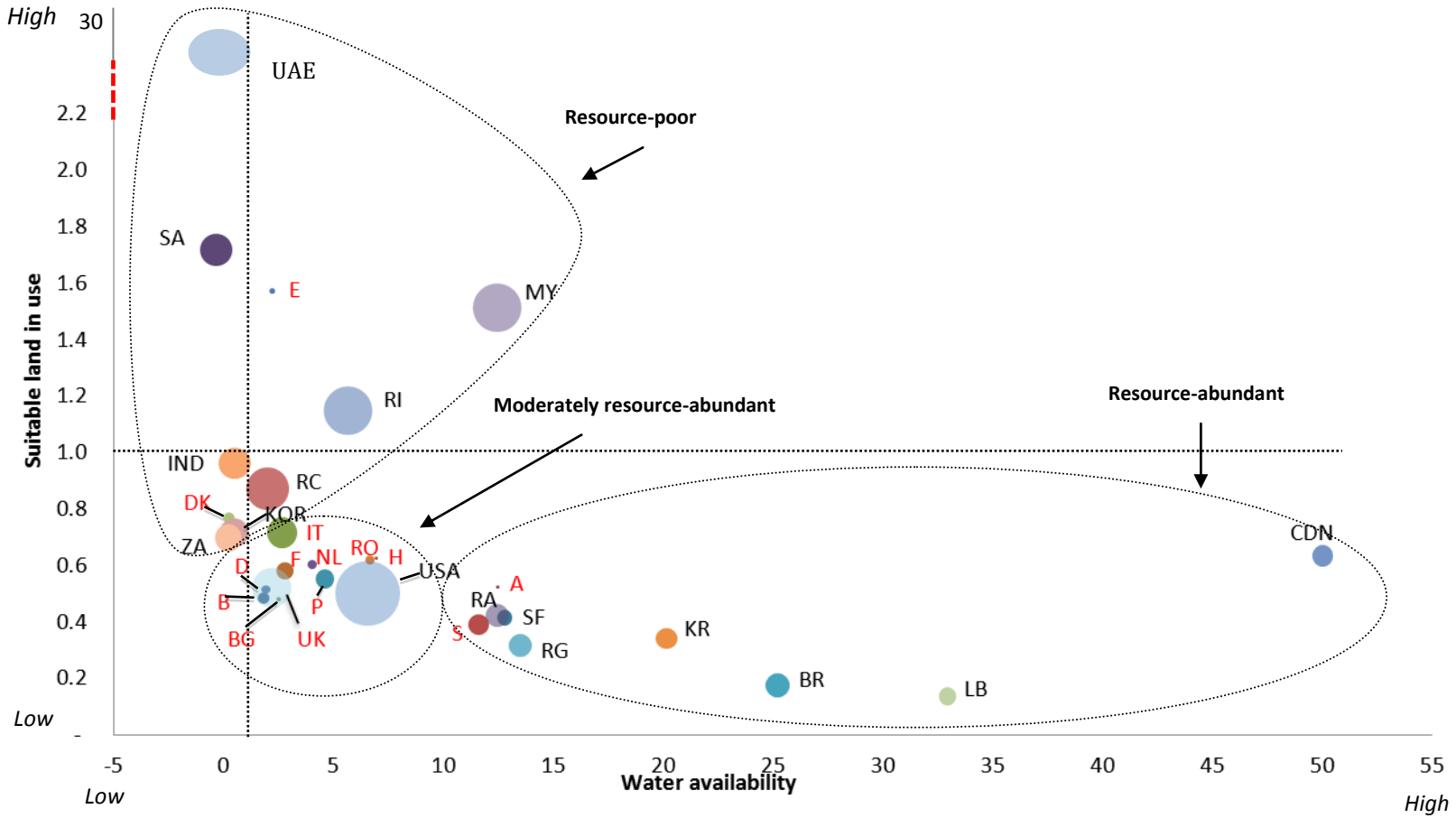
the investments pursued by these investor countries. These countries invest exclusively *outside* their own boundaries.

- **Resource-poor countries.** This group includes countries above the identified threshold of suitable land already in use and/or water-deficit countries. This cluster includes the UAE, Saudi Arabia, Malaysia and Indonesia, as well as India, Korea and South Africa. Denmark and Spain are the only EU countries in this group. The nature of the investments pursued by these countries is dramatically different. Some of these countries invest in fact (mainly or exclusively) *outside* their boundaries, such as the UAE, Saudi Arabia and India. The purpose of these investments is fundamentally associated with the production of foodstuff. Malaysia's investments mainly target other countries but for a different purpose: the production of oil palm. Indonesia instead, is involved mainly in land deals *within* its own boundaries for the production of oil palm and, to a lesser extent, sugar cane.

A part from the USA, it is interesting to notice that the biggest areas of realised investments are associated with investments by the resource-deficit investor countries of the world (*resource-poor countries* cluster). This finding seems to confirm the fact that natural resource scarcity is a fundamental driver of the current rush for land. These types of investments are likely to expand in the future. The investments which seem to be more policy-driven and that include most of the EU countries are, on the contrary, potentially *unstable* if, for instance, new sustainable policies are introduced at the EU and/or country levels.

[27] The countries have been grouped based on the graphical representation of their availability of water and land resources referred to the index of suitable land in use and the water availability index, as displayed in Figure 35 and explained earlier in this section.

Figure 35. Major EU and global investor countries (80% of in operation and/or concluded deals) in relation to local water availability, land quality and land acquisitions.



Argentina	Austria	Belgium	Brazil	Bulgaria	Cambodia	Canada	China	Denmark	Egypt	Liberia
RA	A	B	BR	BG	KR	CDN	RC	DK	ET	LB
Finland	**France**	**Germany**	**Guinea**	**Hungary**	**India**	**Indonesia**	**Italy**	**Korea Rep.**	**United States**	
SF	F	D	RG	H	IND	RI	IT	KOR	USA	
Malaysia	**Netherlands**	**Portugal**	**Romania**	**Saudi Arabia**	**South Africa**	**Spain**	**Sweden**	**United Arab Emirates**	**United Kingdom**	
MY	NL	P	RO	SA	ZA	E	S	UAE	UK	

Note: The vertical axis displays the suitable land already in use. A value closer to 1 indicates less land available of good quality. A value above 1 indicates an overexploitation of suitable land. The horizontal axis displays the water availability indicator. A high value indicates a country's water availability above the identified threshold of water stress. A value below 1 indicates water stress. The size of the bubble represents the total land acquired by each country (in operation and/or concluded deals). *Source: Authors' elaboration (FAO 2010; FAO 2012; Land Matrix 2013; FAO AQUASTAT 2014).*

5. Conclusions

The present study has addressed the role of the EU in the rush for land that has taken place since the early 2000s. The analysis conducted is original in that it has investigated the purpose of the realised land acquisitions by EU countries through analysing the sources of information of each of the deals in operation and/or concluded reported in the Land Matrix database by looking at investors' operation and business, thus overcoming the limits of classifications based on the type of crop grown in the area. The analysis has also shown that EU investments are more driven by the attempt to comply with energy policy-target than to local deficits of land and/or water. These types of investments, especially the ones classified as intended and therefore not yet concluded, are potentially reversible as opposed to resource-driven investments that seem to be more likely to expand in the future if present resource scarcity trends (in the countries identified as resource-scarce) persist.

In relation to EU energy-policy targets, biofuels consumption in all Member States is predicted to increase in the years to come. Most of the renewable energy targets in transport will be satisfied by the deployment of first generation biofuels, which rely mainly on food crops. The competition between food and biofuel production has been identified in the literature on land deals as a consequence of the current international land rush, as well as the negative impacts on both local food security and the environment. The need to abandon mandates on the consumption and production of biofuels in order to reduce the impacts on the prices of foodstuffs has recently been highlighted by the UN Special Rapporteur on the right to food Olivier De Schutter (2014). The need to eliminate policies that subsidise or mandate the production of biofuels in order not to jeopardise food security has also been advocated by the OECD (2013).

Taking the EU perspective, this study has showed that agro-fuel production is one of the main reasons of the land acquisitions pursued by EU countries which are already in operation and the main purpose referred to intended land deals, especially in Africa and Asia. As discussed in section 4.1, the introduction of more sustainable EU energy policies could reduce the extent of future EU land acquisitions for agro-fuel production, by encouraging for instance the transition to advanced biofuels and the use of advanced technology in the EU transport sector, as well as limiting the use of food and feed sources.
Moreover, looking at EU policy with regards to responsible investments linked to the environmental and social impacts of land acquisitions, a part from some sustainability criteria for biofuel productions, specific EU directives, as well as a recognized definition of sustainable or responsible land investments are still missing. In the attempt to address the social and environmental impacts of EU land acquisitions in the targeted countries, the European Commission should promote and develop more clear guidelines and definitions, including specific EU directives to improve transparency of the investments.

This study has also showed that countries most targeted by EU investors are mainly developing countries with a very low level of human development, as indicated by their HDI. Many of the target countries, especially in Africa, suffer from *economic water scarcity*, that is, where water resources are abundant relative to use but malnutrition exists. The role of renewable energy production as a driver of investments in farming land, especially by European member States, has been highlighted. It has been hypothesised that the EU policy targets do play a role in driving these investments rather than natural resource scarcity, as opposed to other global investors. The impacts of large-scale land investments and water acquisitions in the countries targeted by EU investments will be the focus of the second step of this research.

Data on large-scale land acquisitions are affected in fact by a number of disclaimers and caveats, which reflect the rapidly evolving nature of the phenomenon as well as issues of under-reporting or over-reporting, and other sources of inaccuracy. The Land Matrix deployed in this study provides the most comprehensive and updated data set available on large-scale investments in agriculture at global scale and on the implementation stage of each land deal. Being able to distinguish whether a land deal is only intended or concluded, having access to information on contract area, and on whether investors have started crop production in the grabbed land or not is an important step towards a more comprehensive evaluation of land grabbing that goes beyond metrics based only on a spatial extent (Edelman 2013). The lack of transparency is an inherent characteristic of the phenomenon.

The main findings of the study are summarised below.

Global investments

- The land deals reported in the Land Matrix database refer to about 80 Million ha of land, accounting for 5.3% of the world's agricultural land. In over 46 Million ha (39% of total reported deals in any negotiation status) production has started and/or the agreement has been concluded. This amount is almost equivalent to the area of Spain. Africa and Asia are the most targeted continents. Europe accounts for only 2% of the realised land transactions (about 1 Million ha of farming land).
- The land deals currently under negotiation are 205. They refer to 16 Million ha of land: 53% of this land is in Africa (140 deals); 42% in Asia (51 deals).
- 18 countries account for 80% of the realised land transactions (in operation and/or concluded deals). The investments in the top three-investee countries, namely, Indonesia, Papua New Guinea and South Sudan, account for over 30% of the realised land transactions. 10 out of these 18 countries are in Africa. Cambodia and Indonesia are the most targeted countries in terms of number of realised land transactions.
- 80% of total realised land deals are pursued by single investor countries; 19% by more than one investor countries (60% of which are *partnerships between foreign investors and target countries*

- The largest investors are the USA (>6 Million ha), Malaysia, Indonesia (>3 Million ha each), the UAE, China and UK (>2 Million ha land each). The countries that invest in conjunction with other countries to a considerable extent are the UK, China, Guinea, Hong Kong, the USA and Malaysia.
- Agricultural production is the main purpose of almost 50% of the deals currently in operation and/or concluded; 30% of the deals are carried out for forestry purposes.

EU investments

- Large-scale land acquisitions pursued by the EU countries involve 13.7 Million ha of land
- Production has started in 1.6 Million ha of land (20% of total land). Most of the deals in production are found within the EU territory
- The negotiation has been concluded, whether with a written or oral agreement, in 3.2 Million ha of land (40%).
- Africa is by far the most targeted continent. The second most targeted area by EU investments is the European continent (especially Russia).
- 74% of the land agreements pursued by EU countries involve only single investor countries; 26% involve more than one investor countries. In Africa, the number of deals pursued in partnership with the national governments of the target countries almost equals the number of partnerships between foreign investor (respectively, 16 and 19 agreements). In Asia, the partnerships between foreign investors and target countries account for the largest share of multiple country investments (10 out of 14); as well as in America (3 out of 5).
- The UK is the largest EU investor country (almost 2,5 Million ha). Half of its investments are pursued in conjunction with other investor countries. Italy is the second largest EU investor (almost 1.5 Million ha).

Purposes of EU land acquisitions

- Flexible crops are the first reason for the deals in operation accounting for 46% of the total, followed by agro-fuel (23%) and food (22%). Among the 48 deals in operation classified as flexible, 28 are meant to produce food and\or agro-fuel and 20 also refer to industrial uses (multiple uses such as, biofuel, food, cosmetics, and other industrial uses).
- Flexible crops of the deals in operation are mainly grown within the European territory, where the final use is above all for food and\or biofuel production. Industrial uses refer instead mainly to land deals pursued in Africa and Asia (i.e. oil palm and rubber).
- Regarding the concluded deals, agro-fuel is the main purpose, accounting for 39% of the total, followed by flexible crops (28%) and food (18%). However, the amount of land used for flexible crops is higher than in the case of agro-fuel and food.

- The trend toward the expansion of land acquisitions by the EU, under the pressure of demand for biofuels is remarkable, intended land deals show in fact that agro-fuel is driving further demand not only in Africa but also in Asia.
- The land used explicitly for food production is mainly located in Africa, with a tiny share in Europe and it is limited if compared with other uses.

Land and water resources

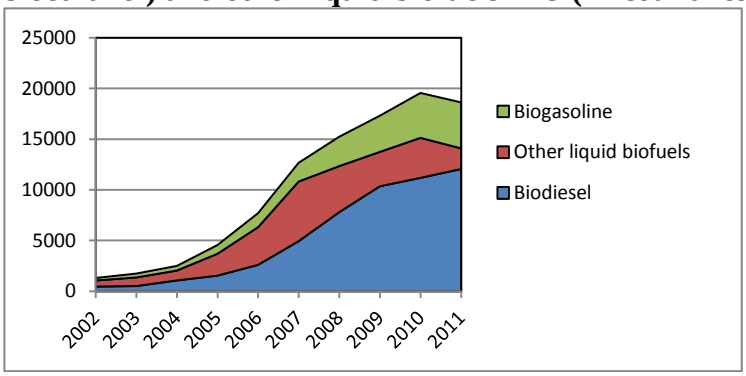
- Almost all of the countries targeted by EU land acquisitions have a large amount of land of good quality, which has not been exploited yet. Most of them show in fact a proportion of agricultural suitable land already in use below 40%. The Philippines and Indonesia are exceptions. For these countries the suitable land is less than the cultivated land, indicating an overexploitation of the land suitable for cultivation.
- The amount of land of good quality and water availability is generally larger in Africa compared with the other targeted countries by EU land acquisitions. However, one African country, namely Burkina Faso shows a level of water availability below the identified threshold of water scarcity (1,700 m3 per capita per year).
- Most of targeted countries by EU investors show very low levels of development. Three of the countries with the lowest HDI, namely Sierra Leone, Guinea, and Mozambique are also the most targeted countries by the EU in terms of hectares of land acquired.
- The biggest areas of realised investments are associated with the resource-deficit investor countries of the world, such as UAE, Saudi Arabia, Malaysia, Indonesia, India and Korea (classified as *resource-poor countries*). This finding confirms the fact that natural resource scarcity is a fundamental driver of the current rush for land.
- Due to a less scarcity of land and water resources of the EU countries (but also USA) (classified as *resource-abundant or moderately resource-abundant countries*), EU (and USA) investments seem to be instead policy driven. Exceptions are Denmark, with the presence of water scarcity, and Spain, with a scarcity of suitable land.

Appendix

Biofuel market in Europe

In 2011 about 65% of the biofuels used in Europe concerned "bio-diesels" (mainly methyl esters), 24% concerned "biogasoline" (mainly bioethanol) and about 11% resided in "other liquid biofuels" (Figure 36).

Figure 36. Biofuels consumption divided in biodiesel, biogasoline (mainly bioethanol) and other liquid biofuels- EU (27 countries) (thousands of tonnes)

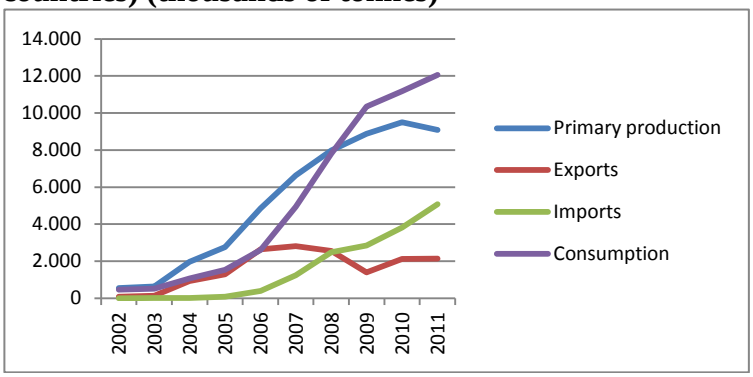


Source: Authors' elaboration (Eurostat 2013. Supply, transformation, consumption - renewables (biofuels) - annual data [nrg_1073a])

Biodiesel

About 65% of all EU consumed biodiesel in 2010 was produced in the EU, about 34% imported from third countries, primarily from Argentina, which has replaced the USA as the largest biodiesel exporter to the EU (Hamelinck *et al.* 2012). In 2011, EU imports of biodiesel have increased from 34% to 42% of total consumption, while primary production has dropped (see Figure 37), and 24% of primary production is exported to third countries.

Figure 37. Biodiesels production, import, export and consumption - EU (27 countries) (thousands of tonnes)



Source: Authors' elaboration (Eurostat 2013. Supply, transformation, consumption - renewables (biofuels) - annual data [nrg_1073a])

The EU remained in 2011 by far the largest producer of biodiesel in the world with 178 Thousand Barrels Per Day (44% of global market share) (Table 7). The main EU producing countries are France, Germany, Spain, Italy and Belgium. North America, Central and South America, and Asia and Oceania have significantly increased the production of biodiesel from 2010 to 2011, especially due to increase in production of the United States, Brazil, Argentina and Indonesia.

Table 7. Biodiesel Production (Thousand Barrels Per Day) – World

	2007	**2008**	**2009**	**2010**	**2011**
North America	33.7	45.9	35.8	24.9	65.9
Central & South America	11.2	35.8	56.9	85.2	103.2
Europe	122.4	150.7	173.9	183.1	177.7
Eurasia	0.7	2.5	3.8	3.3	3.3
Middle East	0.0	0.0	0.0	0.1	0.1
Africa	0.0	0.0	0.1	0.2	0.2
Asia & Oceania	10.8	27.1	38.5	41.0	53.4
World	178.8	262.1	309.1	337.8	403.7

Source: EIA 2013

Most of the EU produced biodiesel in 2010 was produced from rapeseed (56%), followed by soybean (13%) and palm oil (9%) (Hamelinck *et a.* 2012) (Table 8).

Table 8. Ultimate origin of feedstock for EU consumed biodiesel in 2010 (volume of biodiesel - Ktoe)

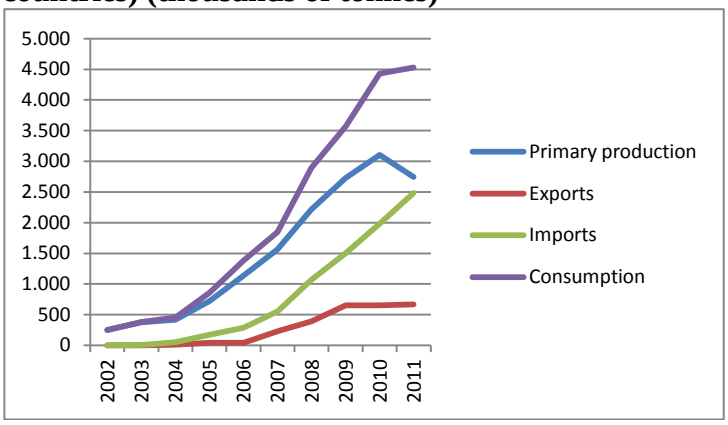
	Rapeseed	Soybean	Palm oil	Sunflower seed	Tallow	Cellulosic Renewable Volume Obligation (RVO)	Other	Total
EU	4098	87	5	444	159	1182	3	5978
Argentina		1191						1191
Indonesia			814					814
Brazil		417			1			418
Canada	212	44			13	22		291
Ukraine	252	14						266
USA	7	221			12	5		245
Malaysia			212					212
Paraguay	3	185						188
Russia	80	45						125
China		1				67		68
Other	99	14	13			1		127
Total	4751	2219	1044	444	185	1277	3	9923

Source: Hamelinck et al. 2012

Bioethanol

About 55% of all EU consumed bioethanol in 2010 is produced in the EU, about 45% is imported from third countries, primarily from Brazil and the USA, although the fraction from Brazil almost halved in comparison to 2008 (Hamelinck *et al* 2012), and 21% of primary production is exported to third countries. In 2011, EU imports of bioethanol have increased from 45% to 55% of total consumption (see Figure 38).

Figure 38. Biogasoline production, import, export and consumption - EU (27 countries) (thousands of tonnes)



Source: Authors' elaboration (Eurostat, 2013. Supply, transformation, consumption - renewables (biofuels) - annual data [nrg_1073a])

In the rest of the world, bioethanol plays a much larger role than biodiesel. World bioethanol production reached 1493 Thousand Barrels Per Day in 2011, of which only 5% were produced in the EU. North America, mainly USA, is the world's largest ethanol producer since 2007 (940 Thousand Barrels Per Day in 2011), followed by Central and South America, mainly Brazil (Table 9).

Table 9. Fuel Ethanol Production (Thousand Barrels Per Day) – World

	2007	2008	2009	2010	2011
North America	439.2	620.6	733.5	891.7	938.9
Central & South America	414.6	497.8	476.5	502.9	415.9
Europe	31.4	47.4	59.3	72.1	72.8
Eurasia	0.7	0.7	1.3	1.2	0.4
Africa	0.2	0.3	0.5	0.9	0.6
Asia & Oceania	38.4	48.5	55.2	58.8	64.8
World	924.5	1215.2	1326.3	1527.6	1493.5

Source: EIA 2013

More than half of the EU produced ethanol is on basis of starch crops (30% from wheat, 23% from maize and smaller contributions from barley and rye). Sugar beet represents another 30% (Table 10).

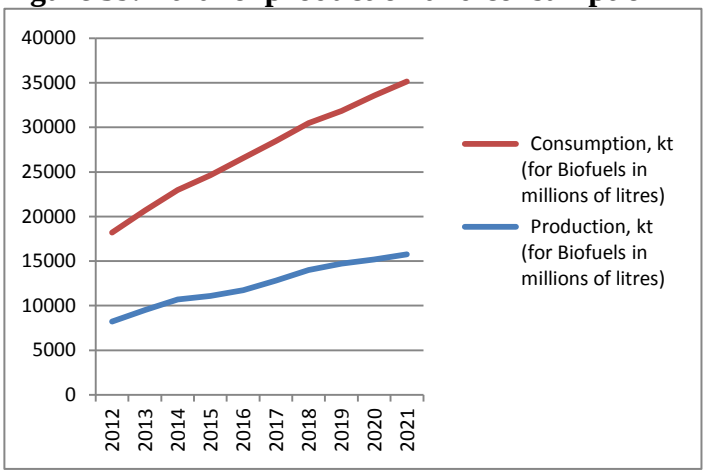
Table 10. Ultimate origin of feedstock for EU consumed bioethanol in 2010 (volume of biodiesel - Ktoe)

	Wheat	Maize	Barley	Rye	Triticale	Sugar beet	Wine	Sugar cane	Other	Total
EU	581	344	58	81	20	733	101		33	1951
Brazil		8						234		242
USA	2	122								124
Peru								26		26
Switzerland	25									25
Bolivia								20		20
Ukraine	6	7				2				15
Egypt								15		15
Guatemala								14		14
Argentina		2						5		7
Cuba								6		6
Other	10	7						16	2	35
Total	624	490	58	81	20	735	101	336	35	2480

Source: Hamelinck et al. 2012

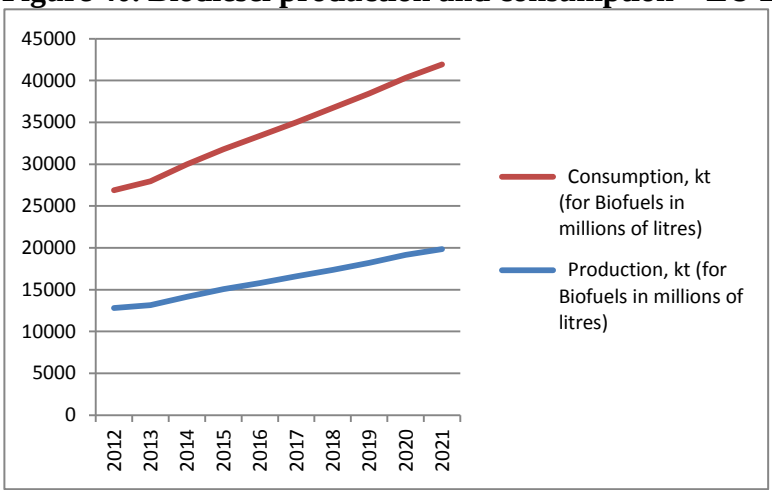
According to OECD-FAO projections in Europe the consumption of biofuels will increase more than its production in the period 2012-2021 (see Figures 39 and 40 for ethanol and biodiesel projections). Therefore, an increase of EU imports from third countries of ethanol and biodiesel is expected for the years to come.

Figure 39. Ethanol production and consumption – EU 2012-2021



Source: Authors' elaboration (OECD-FAO Agricultural Outlook 2011-2020)

Figure 40. Biodiesel production and consumption – EU 2012-2021



Source: Authors' elaboration (OECD-FAO Agricultural Outlook 2011-2020)

GLOSSARY

AGRICULTURE

Arable land

Arable land is the land under temporary agricultural crops (multiple-cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow (less than five years). The abandoned land resulting from shifting cultivation is not included in this category. Data for "Arable land" are not meant to indicate the amount of land that is potentially cultivable. Data in the FAO database are expressed in 1000 hectares.

Permanent crops

Crops are divided into temporary[28] and permanent crops. Permanent crops are sown or planted once, and then occupy the land for some years and need not be replanted after each annual harvest, such as cocoa, coffee and rubber. This category includes flowering shrubs, fruit trees, nut trees and vines, but excludes trees grown for wood or timber.

Arable land and permanent crops

Arable land and Permanent crops, this land category is the sum of areas under "Arable land" and "Permanent crops". Data in the FAO database are expressed in 1000 hectares.

Agricultural area

Agricultural area, this category is the sum of areas under a) arable land - land under temporary agricultural crops (multiple-cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow (less than five years). The abandoned land resulting from shifting cultivation is not included in this category. Data for "Arable land" are not meant to indicate the amount of land that is potentially cultivable; (b) permanent crops - land cultivated with long-term crops which do not have to be replanted for several years (such as cocoa and coffee); land under trees and shrubs producing flowers, such as roses and jasmine; and nurseries (except those for forest trees, which should be classified

[28] Temporary crops include vegetables, melons and watermelons. They contain three major groups of fodder: grasses, including cereals harvested green; legumes, including pulses harvested green; and root crops that are cultivated for fodder. All can be fed to animals as green feed; as hay, i.e. crops harvested dry or left to dry if harvested green; or as silage products. Silage or ensilage is a method of preservation of green fodder through fermentation to retard spoiling.

under "forest"); and (c) permanent meadows and pastures - land used permanently (five years or more) to grow herbaceous forage crops, either cultivated or growing wild (wild prairie or grazing land). Data are expressed in 1000 hectares.

Source: FAO Glossary

WATER RESOURCES

Blue water

Blue water refers to the freshwater contained in surface bodies and aquifers.

Blue water availability

Blue water availability results from natural run-off (through groundwater and rivers) minus environmental flow requirements. Blue water availability typically varies within the year and also from year to year.

Green water

The precipitation on land that does not run off or recharge the groundwater but is stored in the soil or temporarily stays on top of the soil or vegetation. Eventually, this part of precipitation evaporates or transpires through plants. Green water can be made productive for crop growth (although not all green water can be taken up by crops, because there will always be evaporation from the soil and because not all periods of the year or areas are suitable for crop growth).

Green water availability

Green water availability is equal to the evapotranspiration of rainwater from land minus evapotranspiration from land reserved for natural vegetation and minus evapotranspiration from land that cannot be made productive.

Source: Water footprint glossary

LAND ACQUISITIONS

Land deals

The Global Observatory includes deals that are made for agricultural production, timber extraction, carbon trading, industry, renewable energy production, conservation, and tourism in low- and middle-income countries.
Deals must:

- Entail a transfer of rights to use, control or ownership of land through sale, lease or concession;
- Have been initiated since the year 2000;
- Cover an area of 200 hectares or more;
- Imply the potential conversion of land from smallholder production, local community use or important ecosystem service provision to commercial use.

Target country

The countries where land deals take place.

Investor name

It refers to the individual, company, including investment funds, or state agency that acquires land. The **primary investor** is the entity directly engaged in the land deal, while the **secondary investor** is the entity that partly or wholly funds or owns the primary investor.

Investor country

The country from which the investor originates. It is the same as the target country if it is a domestic investor. Investors may be private actors, governments or government-backed private actors.

Intention

- Agriculture
- Forestry
- Industry
- Tourism
- Conservation
- Renewable energy

- Other

Negotiation status

- ***Intended***
  - Expression of interest: it demonstrates an investor's non-binding interest in realizing an investment in agricultural land;
  - Under negotiation: it refers to land deals that are currently under negotiation.
- ***Concluded***
  - Oral agreement: it refers to land deals that have been concluded by means of an oral agreement;
  - Contract signed: it refers to land deals that have been concluded by means of a written, formal agreement.
- ***Failed***
  - Negotiations failed: it refers to land deals failed during the negotiation phase;
  - Contract cancelled**:** it refers to land deals failed after conclusion of the negotiation phase. It is a failure category for concluded deals.

Implementation status

- **In operation (production):**
  It refers to the concluded deals;
- **Start-up phase (no production):**
  It refers to concluded deals and also to blanks;
- **Project not started:**
  It refers to intended as well as concluded deals;
- **Project abandoned:**
  It refers to failed deals.

Size of land deals

- **Intended size.** The area that was formerly or is currently intended to be acquired by the investor. In many cases, this is the area size announced before or during the negotiation phase of an investment. However, it may also reflect the intention of future expansion;
- **Contract size.** The current area that has been leased or purchased by the investor;
- **Production size.** The current area that is already operational.

Nature of the deal

This variable describes the legal status of the land transaction. The Land Matrix database distinguishes between:

- Exploitation license;
- Lease / Concession;
- Lease / Concession, Exploitation license;
- Outright Purchase;
- Outright Purchase, Exploitation license;
- Outright Purchase, Lease / Concession.

Contract farming

Contract farming refers to pre-agreed supply contracts between farmers and buyers for the supply of agricultural produce. Contract farming arrangements vary widely depending on countries, crops and companies, but generally can be located either inside or outside of the land acquired by an investor. Pure contract farming does not involve acquisition of land by external investors. The Global Observatory also records cases of pure contract farming. However, as the land used by contract farmers outside the area of a land acquisition does not change its tenure status, we do not include this land in our aggregate figures of land acquisitions. Currently, deals related to pure contract farming do not satisfy the minimum size requirements of the website (200Ha), and consequently are not visible on the Land Matrix website.

Source: Land Matrix and authors' elaboration

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