Global investments in agricultural land and the role of the EU: Drivers, scope and potential impacts

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Introduction

Land and water resources are central to societal development, as they are two of the most important agricultural production factors. Water and land use are intrinsically linked to global challenges stemming from population trends; food insecurity and poverty; environmental degradation and the impairment of related ecosystems and ecosystem services; climate uncertainties; shifting consumption patterns; and higher and volatile food prices (FAO, 2011; Bruinsma, 2009; WWAP, 2009).

Agricultural production is by far the most water-intensive human activity. Agriculture uses 11% of the land surface (FAO, 2011) and consumes, on a global average, 70% of the freshwater drawn from aquifers, streams and lakes (FAO, 2013). Water demand for the agricultural sector is projected to increase by at least 20% by 2050, even in the presence of productivity improvements through technological development (De Fraiture et al., 2007). By 2030, an additional 47 million ha of land 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 (ERD, 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 (FAO, 2011).

Against this backdrop, a renewed interest in agricultural investments has been widely reported and associated with the emergence, since the mid-2000s, of the acquisitions of large tracts of agricultural land in Africa, Latin America and Asia. This phenomenon has often been referred to as *land grabbing*, a term referring to acquisition occurring in violation of human rights, not based on free, prior and informed consent of the affected land users (ILC, 2011). Land acquisitions have accelerated since 2007–2008, especially as a consequence of the ban on exports and the increase in export levies set up by many food-exporting economies (De Schutter, 2011).

Large-scale land acquisitions involve governments and private investors from both industrialised countries and emerging economies securing large tracts of farming land (over 1000 ha) by means of long-term leases, which typically run from 55 to 99 years, or purchase agreements. Land agreements involve five different types of investors–private companies, state-owned companies, investment funds, public–private partnerships and private individuals (Anseeuw et al., 2012). Some investments are aimed at natural resources for agricultural (food or bioenergy) or ecosystem purposes; others are characterised by actors controlling different phases of the value chain (Anseeuw and Ducastel, 2013: 40).

Reliable data and transparent information about the scope and status of land acquisitions remain elusive. As highlighted by Deininger et al. (2011) and Woertz (2011), many of the reported

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land deals have either not materialised or the land has not started to be farmed. Available data reveals a concentration of investments in low-income countries, with a high incidence of hunger and weak land institutions (FAO, 2012a,b), leading to the risk of weak governance of investments and consequent negative environmental and socio-economic impacts. The water dimension implicit in large-scale land acquisitions has not been recognised until very recently (Allan et al., 2013; Rulli et al., 2013). In this context, water and agricultural land have thus become *global* resources, contended not only between local communities but also between multinational companies and different countries.

There are three key drivers for the growth in investment in agricultural land. First, the need to secure reliable food supplies in the long term, especially for land and/or water-scarce countries. This is the case, for instance, in the arid and semi-arid, food-deficit, oil-rich economies of the Middle East (Jägerskog et al., 2012). Second, the increasing demand for agro-fuels, especially in Europe and the US, supported by energy directives (EU Directive, 2009; EISA, 2007), subsidies and incentives. The land acquired for production of non-food crops, flexible crops (such as sugarcane and oil palm) and multiple uses account for about 70% of the land acquired glob-ally (Anseeuw et al., 2012). Biofuel production is the main purpose of the investments targeting Sub-Saharan Africa (Giovannetti and Ticci, 2013). Third, speculation on future increases in the price of agricultural land. Proximity to export markets is not a driver itself, but actually determines where these investments are located (De Schutter, 2009).

The scale and orientation of the current wave of investments have brought this phenomenon to worldwide attention. Discussions about the phenomenon are polarised and reflect the different positions on the opportunity and risks associated with these invest-ments in the targeted countries. Some authors have highlighted the need to govern investments effectively to mitigate risks and seize opportunities (Cotula et al., 2009); others have highlighted their negative impacts on natural resources exploitation, liveli-hoods and sovereignty (Davis et al., 2014; Rulli and D'Odorico, 2013; Jägerskog et al., 2012; Deininger, 2011; De Schutter, 2011; Matondi et al., 2011). The opportunities for economic and social development that may arise from capital inflows in the target economies have also been pointed out (World Bank, 2011; German Federal Ministry for Economic Cooperation and Development (BMZ), 2009).

The EU member states are emerging as some of the most active actors in international agricultural land investments all over the world, but especially in Africa (Antonelli et al., 2015). The debate within the EU on the potential impacts of these investments in the target countries has increased over the last years (Friends of the Earth Europe, 2014; Von Witzke and Noleppa, 2010). As a consequence, specific references to land deals and to social and environmental sustainability criteria have been included in a number of EU policies and directives. The EU policy framework (2011), for example, calls for transparency of contract negotiations to protect land use rights, food and water security of the local populations. Moreover, according to the Renewable Energy Directive (RED), bilateral and multilateral agreements for the production of bio-fuel have to comply with sustainability criteria (EU Directive, 2009, Directive 2009/28/EC). Increasing understanding about the role the EU plays in the current wave of transnational land deals seems to be of paramount importance to inform policymakers and institutional actors, at both the EU and member states level, about the design of effective policies to enhance environmental sustainability of the investments and to promote development in the target countries. The role that the EU plays both as an investor and as a recipient of investment in agricultural land is still quite an unexplored field of research, with the exception of a few studies (such as, Von Witzke and Noleppa, 2010).

In this context, this article has three main purposes. First, to explore the role that investments from the EU member states (including *all* types of investment, i.e., state-led, private and private–public partnerships) play in the global rush for land. The investments considered include both those involving investors from EU countries only and partnerships of EU investors with different countries. Some of these partnerships involve investors from the investee countries. Agricultural land acquisitions are analysed in terms of the dimension of the investments, their geography and main scope. Second, the study aims to investigate the main drivers of land acquisitions from European countries and their relationship with EU agricultural and energy policies and targets; the main purposes of land acquisitions (food or biofuel); and the extent to which the availability of land and water resources can be considered as a driver of land acquisitions. Third, the study looks at the potential impacts of EU farmland investments on land and water resources in the host countries. This aim is pursued by assessing the availability of suitable land and water in the different target countries with respect to the area of land acquired by European land investment projects, to determine possible implications in terms of land and water scarcity. The study argues that, when designing energy and other policies, it is important that the EU policymakers take into consideration the potential implications for local natural resources of these policies for investments in agricultural land.

The analysis is based on a comprehensive review of the literature on land deals, combined with the analysis of the current most complete public dataset available on global land investments, i.e., Land Matrix. Indices on land suitability and water availability of both target and investor countries have also been developed to understand the drivers of EU land acquisitions in terms of land and water scarcity, as well as the potential consequences on water and land resources of EU land deals in the most targeted countries. Moreover, to put the role of the EU into a global perspective, the above indices have been also calculated for the biggest investors at the global level.

The remainder of the study is structured as follows. The next sec-tion describes the data sources and methodology of the study, and provides a discussion of the main challenges associated with the available datasets. Section 3 explores the scope and characteristics of the EU large-scale land acquisitions. Section 4 is concerned with the drivers of such investments. Section 5 discusses the potential implications of European farmland investments, focusing on land and water scarcity in the target countries. The final section draws some conclusions.

Data sources and methodology

The Beta version of Land Matrix,[1] an online public database reporting global land transactions, launched in April 2012 and upgraded in June 2013, provides the main source of data deployed in this study to account for land acquisitions worldwide. The land transactions included in the Land Matrix database are those which 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 ha or larger; and were not concluded before the year 2000. The Land Matrix database records cases of intended and realised land deals involving foreign or domes-tic investors, at any level of implementation (under negotiation, start-up phase, in operation, failed), obtained through a variety of cross-referenced sources ranging from research papers, personal information, field-based research projects, government records,

[1] The dataset was downloaded on 16 October 2013.

company websites and media reports. The deals considered here include both domestic and transnational land deals.

The reported deals refer to six main sectors: food, fuel, tim-ber, carbon sequestration, mineral extraction and tourism. 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 (Anseeuw et al., 2012). 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 shown that many of the reported land transactions have either never mate-rialised or are not in operation (Verhoeven and Woertz, 2012). According to Pearce (2013), databases on land transactions are gen-erally influenced by both over- and under-accounting. Therefore, due to the inherent limitations of large-scale global inventories on land deals, this study does not aim to identify the exact amount of the land acquired by EU investors only. It aims instead to high-light the trends, drivers and patterns of investments in agricultural land from EU investors, both as single investors and in collaboration with other investors (including partnerships with other interna-tional investors or with investors from investee countries), and to assess their potential impacts in the target countries in terms of land and water resources.

Moreover, to overcome some of the biases explained above regarding data, the study does not take into account projects reported by Land Matrix as *failed*. It also distinguishes between intended land deals and land transactions where production has already started and where the negotiation is concluded (either by means of an oral or written agreement) but production has not started yet (hereafter referred to as *realised* land acquisitions). It has been demonstrated that intended land deals are less reliable than the ones classified as concluded, since, for various reasons (e.g., profitability and trends in international markets and domestic demands) intentions may not translate into actual production realities (Cotula et al., 2014; Anseeuw et al., 2013). The size of the investments has generally been accounted for by employing contract size data, as reported by the Land Matrix database. When contract size areas were not available, production size data were deployed. Areas reported as 'intended size' were used only when neither contract nor production sizes were available.

The competition between food and energy production in the context of the EU land acquisitions has been pursued through the analysis of the final uses of the land acquired. The analysis included all the deals whose purpose was explicitly categorised as 'agricul-ture' in the Land Matrix database. Under this classification, the Land Matrix database reports the type of crops grown on the land. How-ever, Land Matrix does not distinguish between the final uses of the crops. Most of the crops reported by Land Matrix can be used for dif-ferent purposes such as food, agro-fuel, industrial and flexible uses. To analyse the final scope of the deals, we triangulated the informa-tion on the crops grown on the land with the company investors' main activities. The latter information is provided by Land Matrix.

To give an example of the triangulation of the information explained above, let us consider for instance a specific land deal concluded by Italy in Nigeria of 11,292 ha. The Land Matrix database provides the following information for this deal: the investor country (Italy), the intention of the deal (agriculture), the status of negotiation (concluded and contract signed), the status of implementation (in production), the nature of the deal (lease/concession), the source of information (policy report), the crop grown in the land (oil palm) and the investor name (Fri-El Green Power). By looking only at the crop grown in the land, in this case oil palm, the deal would be classified as *flexible*, since oil palm has multiple uses, such as food, biofuel or industrial. How-ever, looking at the investor company website, Fri-El Green Power is one of the leading companies in Italy in the field of green energy production, so there is no doubt that the scope of this deal is for biofuel. This triangulation of the information has been applied to all EU land deals. Nevertheless, in cases where the above classification was not so obvious due to multiple crops cultivation and/or the presence of investor companies with multiple activities (food, biofuel and industrial productions), the deals were still classified as flexible. Moreover, most of the companies involved in multi-ple activities and with the cultivation of flexible crops, such as oil palm and sugar cane, usually choose the final use of the products depending on their quotations on the international markets; therefore, producers can easily switch between end-markets to capitalise on price differentials (Borras et al., 2013; Hall, 2011). This is, for example, the case of the SIAT group, a Belgium company invest-ing in agro-industrial productions in the tropics, especially Africa, for the production above all of oil palm and rubber for biofuel and other industrial uses (Siat Group SGCP, 2014). In all these cases, the final use of the land was classified as flexible.

Apart from a few studies which look at a specific target region, such as Sub-Saharan Africa (Schoneveld, 2014), based on information on land deals collected on the ground, the triangulation of the information explained above applied at larger scales, such as continents, is still rare. Our classification thus differs from the ones provided by other studies and based on Land Matrix, such as Borras et al. (2011) and Anseeuw et al. (2012), by including a cross-check of the information on crops with investor companies' main activities, so leading to a more precise classification of the main scopes of each European land deal. Based on the triangulation of the information on land deals explained above, the final purposes of the EU land acquisitions are classified into the following 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 and 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) by the investor company.
- **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 or flowers.
- **Unknown,** when it is impossible to classify the use of the land among the previous categories because of the lack of information on the crop grown in the land and/or the investor company.

Information on land deals, such as number of deals and hectares of land acquired has been combined with other environmental and socio-economic information. The study deploys the Human Devel-opment Index (HDI) as a proxy for socio-economic development in the target countries.[2] To analyse land and water resources in terms of both drivers and possible impacts, an index of suitable land in use and a water availability index have also been developed. The *index of suitable land in use* is defined as the ratio between the cultivated land (arable land and land with permanent crops) and the very suit-able, 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[3] (FAO, 2012b). This index thus

[2] The HDI measures human development based on the following indices: life expectancy at birth; mean years of schooling and expected years of schooling; and GNI per capita (UNDP, 2013).

[3] 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.

identifies the amount of land suitable for agriculture already in use in a given country. The *water availability index* identifies the water available in the different countries under consideration based on the local availability of 1700 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 (2014).[4]

Global land acquisitions and the role of the EU

Scope and geography of global and EU land investments

The number of land transactions reported in the Land Matrix database exceeds 1600 and involves about 80 million ha of farming land around the world, corresponding to 5.3% of the world's agricul-tural land as reported by the FAO (2003). The reported land deals include intended, realised and failed land deals, and can involve both single and multiple investor countries, which mainly target the world's developing economies. A large portion of these land agreements has been formalised by means of a written or oral agreement, but only one-third of them are reported as being 'in operation'. One-third of the land deals already in operation involve the target country as one of the investors. The *realised* land agreements, defined as the sum of land deals in production and/or concluded, account for over 46 million ha, an area almost equivalent to Spain and corresponding to about 2.5% of world's agricultural land and half of that reported in the Land Matrix database. The realised investments target Africa and Asia the most (Fig. 1).

The major investor countries at the global level are shown in Fig. 2. Two EU countries, namely, the UK (6th) and Italy (10th) are ranked among the largest investors in agricultural land at the global level. A substantial share of the land transactions pursued by the UK is in conjunction with other investor countries. Agricultural production is the main purpose of the deals currently in operation and/or concluded (49%); the second most important use of land is forestry (26%).

The investments *realised* (sum of concluded and in operation land agreements) by the EU, both as the only investor and in partnership with other non-EU investors, account for about 20% of the total reported realised investments in farming land at the global level. The land acquired by the EU countries accounts for 23% of the total concluded land agreements; 13% are in operation; 17% are intended; and almost 20% failed (Fig. 3) (see Section 3.3 for further information about the land acquired by EU investors only and in partnership with other non-EU investors).

Africa hosts the largest share of EU land acquisitions (Fig. 4). About 90% of the concluded deals, involving about 5 million ha of land can be found here. African countries are also the main target of intended land acquisitions by the EU (54%), with Asian countries (44%) following. The largest portion of land where actual production has started is found in Africa (45%), but also Europe (25%) and, to a smaller extent, America (17%) and Asia (13%).

Fig. 5 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. Most of the investments are located in Africa and include Guinea, Mozambique, Sierra Leone, Liberia, Benin, Burkina Faso and Zambia. The largest number of land agreements is found in Mozambique and Indonesia (about 25 each). Guinea shows by far the largest amount of acquired land (almost 2.5 million ha), despite the limited number of deals (4). Mozambique, Sierra Leone and Guinea make up 50% of the total area of land acquired by EU countries.

EU land acquisitions within the European continent

The second most targeted area (15% of the total land acquired) by single EU investments, after Africa, is the European continent. The evidence of large-scale land acquisitions in Eastern Europe and Cen-tral Asia is not a new discovery. A number of studies have focused on the relevance of foreign land acquisitions in these areas over the past few years (Visser et al., 2012; Visser and Spoor, 2011). Accord-ing to a study carried out by the World Bank, in 2009 Central and Eastern European and Central Asian regions held fourth place in relation to the acreage acquired after Africa, Asia and Latin Amer-ica (World Bank, 2009). The EU continent hosts three of the four countries in the world in which the FAO recognises that there is significant capacity to meet the growing global food demand (Ukraine, Russia and Kazakhstan; Pearce 2012). Ukraine and Russia are also already important providers of feedstocks for the EU biofuel market and production in those countries is expected to grow according to the EU biofuel targets that are addressed in more details in Section 4.

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 thousand ha, which accounts for about 9% of the total of land acquired by the aggregated EU countries. For the majority of land acquisitions, 13 deals in total, corresponding to 714,961 ha, crop production has already started. The negotiation process has been concluded, but production has not started yet on 8000 ha of land (one deal in Ukraine).

If we look at the European countries most targeted by EU investors, the Russian Federation occupies first position followed by Ukraine, Bulgaria, Romania and Lithuania (Fig. 6). Land acquisitions in these countries are pursued by Sweden followed by Denmark, France, Bulgaria, Finland and Germany. The majority of these land deals, approximately 72%, are meant to produce flexible crops, which can be used for food or biofuel production (such as, among the others, rapeseed, sugar beet, soybean and sunflower), and 21% to produce food only (mainly cereals). Only one deal is for forestry.

Profile of the investors

Most of the land deals pursued by European countries involve only investors from one European country. The investments pursued by investors from two or more countries, including at least one European investor, either investors in the target countries (and can thus be referred to *partnerships between foreign investors and target countries*) or are *partnerships between foreign investors* only (Fig. 7). The partnerships between EU investors and investors from the country targeted by the land acquisitions account for 29% of the EU land acquisitions (by acreage) and amount to over 2 million ha. Fig. 7 shows that, in Africa, the number of deals pursued by European investors in partnership with national governments almost equals the number of partnerships between foreign investor only (i.e., European investors with other international investors; 16 and 19 agreements, respectively); in Asia, the partnerships between foreign investors and target countries account for the largest share of multiple country investments (10 out of 14); as the same is true in America (3 out of 5).

[4] Although this index does not consider soil moisture (due to data limitations) which is a pivotal source of water for agricultural production globally, it is deployed to provide useful information for comparing the endowments and potential impacts of land acquisitions in the main targeted countries. If we added green water this could, in some cases, double the water available. For a detailed discussion on green and blue water availabilities, see Gerten et al. (2011).

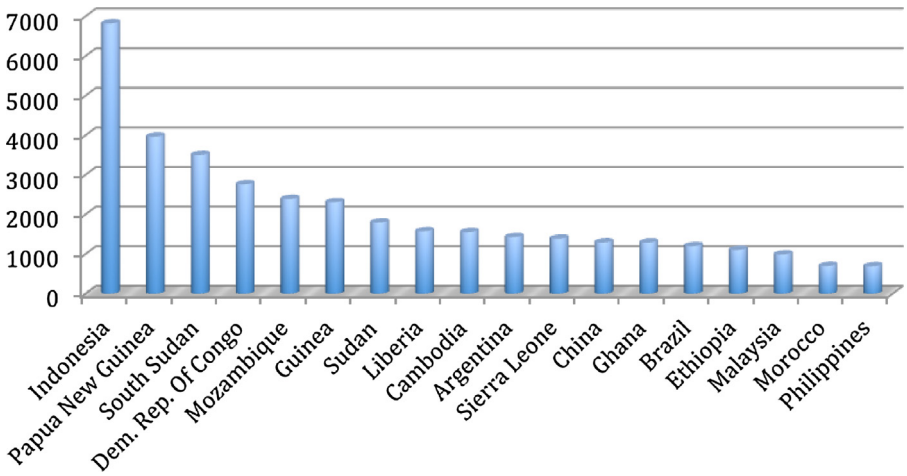


Fig. 1. Target countries of global land acquisitions (1000 ha, deals in operation and/or concluded)[a]. Source: Authors' elaboration (based on Land Matrix as of 16 October 2013).

[a] The land deals pursued in these countries account for 80% of the *realised* land transactions (in operation and concluded deals) at the global level.

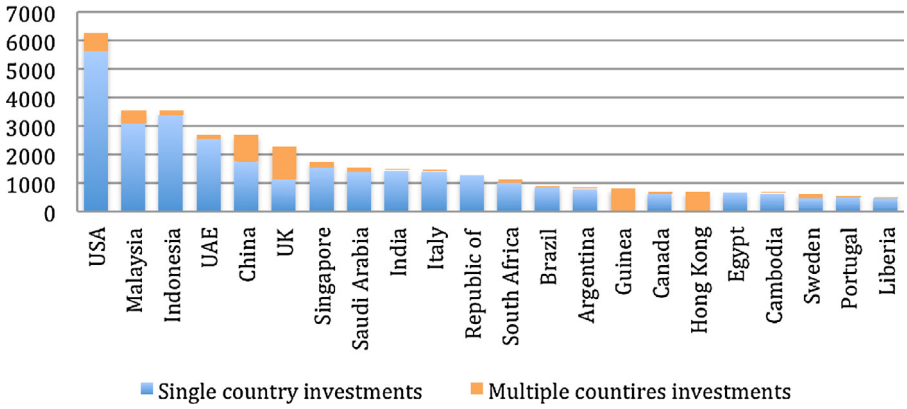


Fig. 2. Investor countries (1000 ha, single and multiple country investments, deals in operation and/or concluded)[b]. Source: Authors' elaboration (based on Land Matrix as of 16 October 2013)

[b] These 18 countries account for 80% of the deals, which are in operation and/or concluded at the global level.

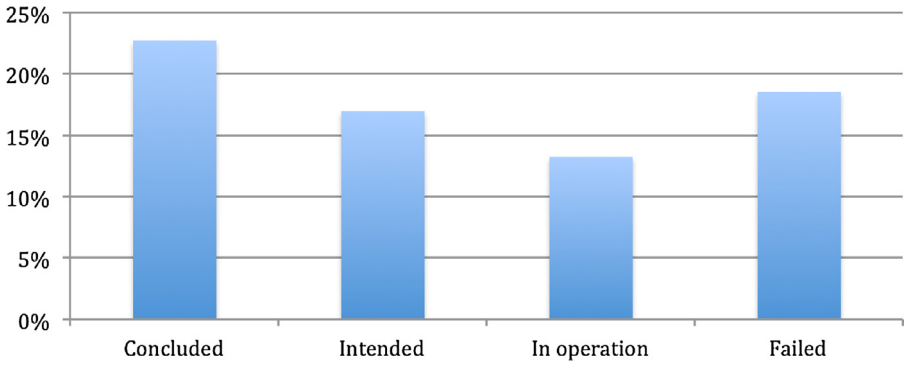


Fig. 3. Percentage of land acquired by the EU in the different types of land agreement at the global level. Source: Authors' elaboration (based on Land Matrix as of 16 October 2013)

Fig. 8 ranks the EU countries involved in large-scale land acquisitions by the size of agricultural land acquired, where either production has started or the negotiation has concluded by means of an oral or written agreement. The UK is the largest EU investor country. There are 21 deals pursued in partnership with other investors (12 of which are in Africa and 9 in Asia) out of 68 total realised land agreements, and these 21 deals account for about half of the acquired land. Production has started in 12 out of the 21 land agreements. There are 13 partnerships between foreign investors; whereas, there are eight investments involving investors in the target countries. Italy is pursuing two land agreements in partnership with other investors. 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. Sweden, Finland, France, Germany and the Netherlands are also involved in multiple country investments.

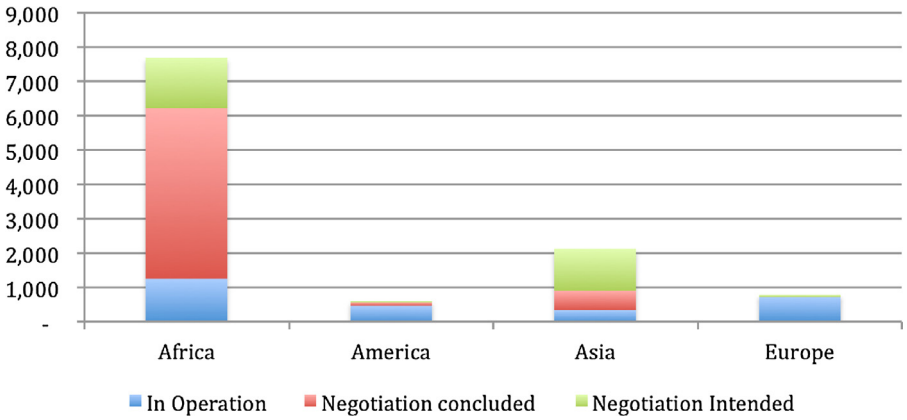


Fig. 4. Distribution of EU land acquisitions in the different continents (ha). Source: Authors' elaboration (based on Land Matrix as of 16 October 2013)

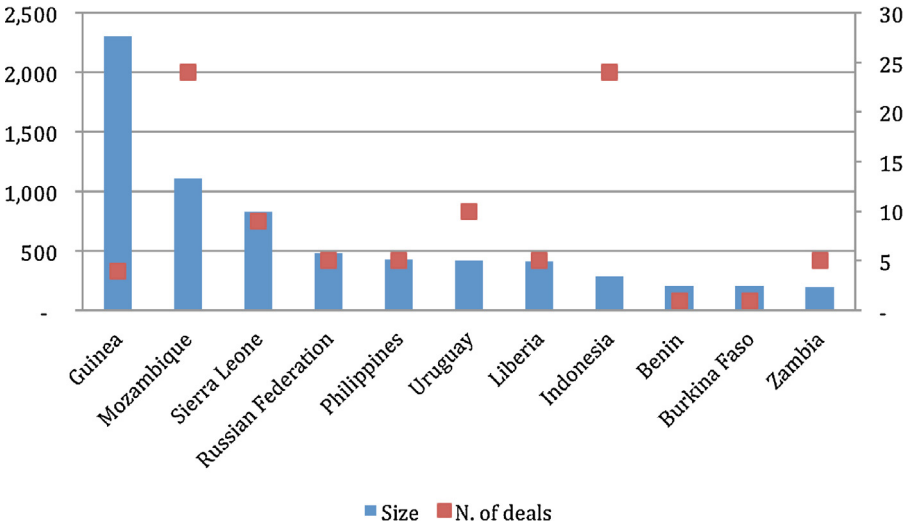


Fig. 5. Countries targeted by EU land acquisitions (total ha, in operation and concluded deals pursued by single and multiple investor countries). Source: Authors' elaboration (based on Land Matrix as of 16 October 2013)

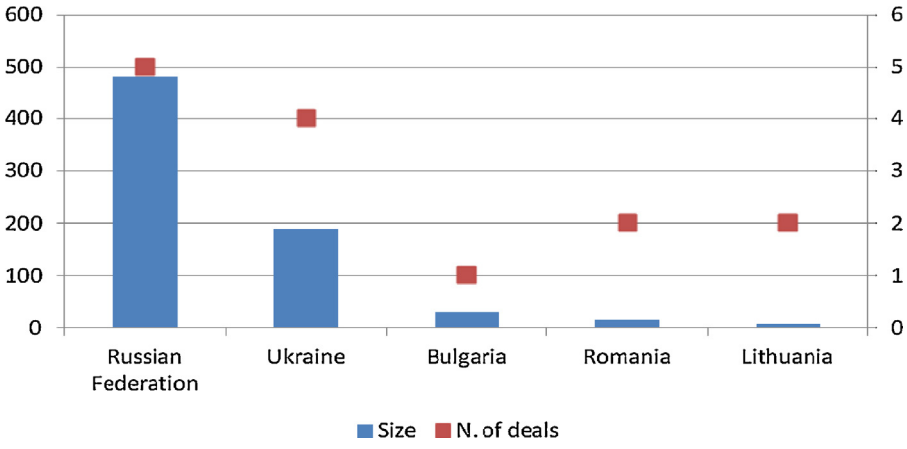


Fig. 6. Countries in the European territory targeted by EU land acquisitions (total ha, in operation and/or concluded deals pursued by single and multiple investor countries). Source: Authors' elaboration (based on Land Matrix as of 16 October 2013)

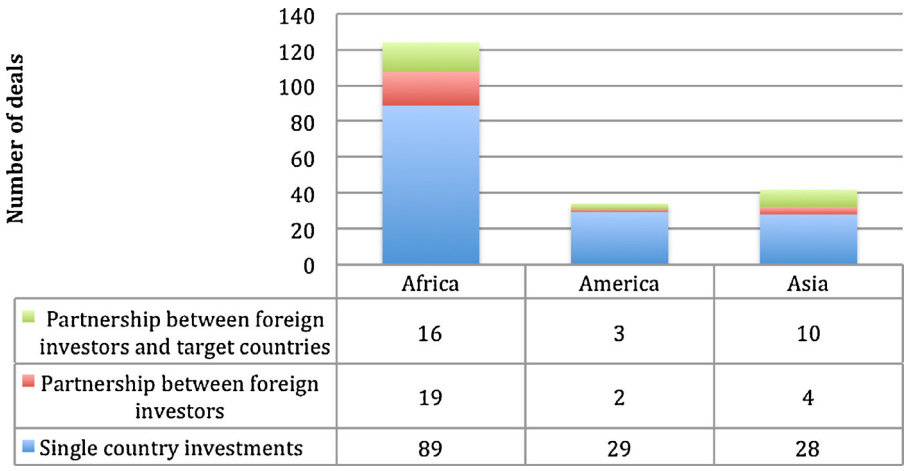


Fig. 7. Partnership between foreign investors and target countries, partnership between foreign investors only (number of deals, in operation and/or concluded deals). Source: Authors' elaboration (based on Land Matrix as of 16 October 2013)

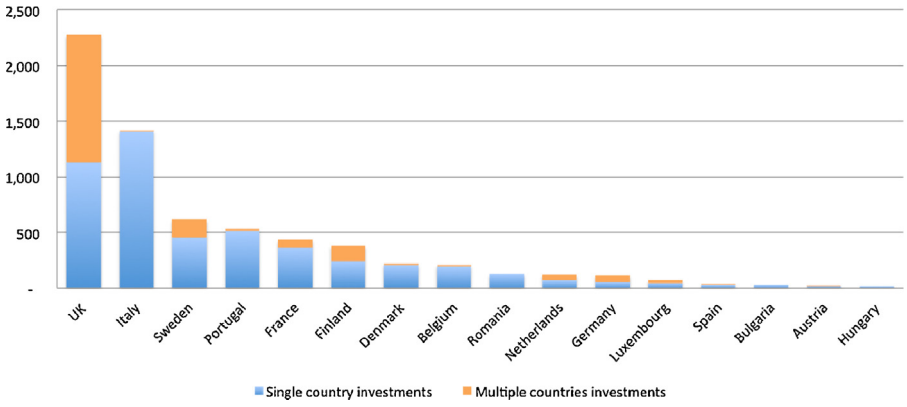


Fig. 8. EU investor countries (1000 ha, deals in operation and concluded). Source: Authors' elaboration (based on Land Matrix as of 16 October 2013)

Drivers of EU land acquisitions: policies, scope and natural resources

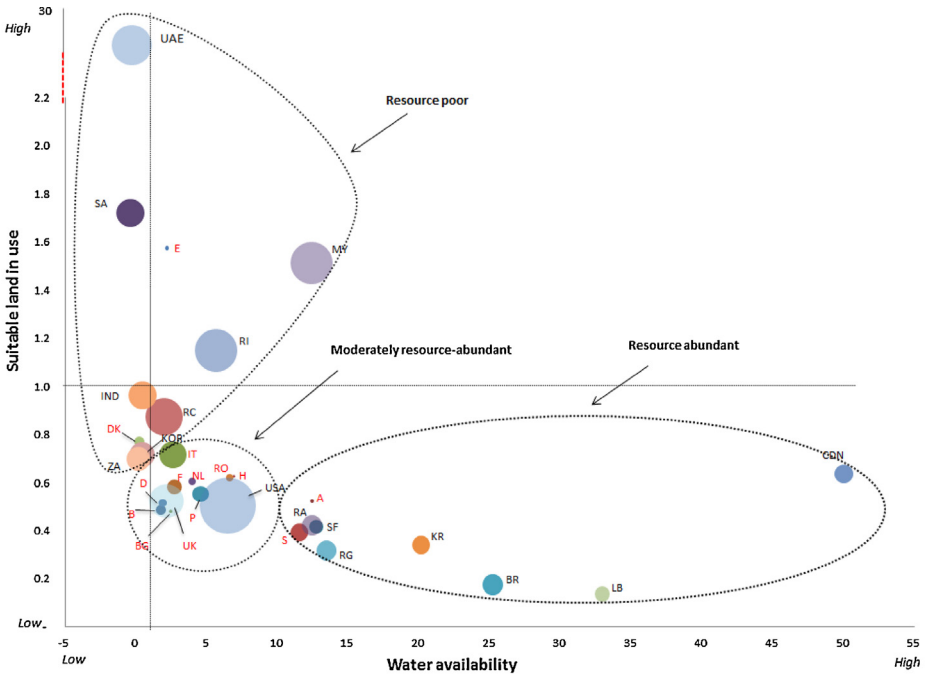
Water and land availability

Land and water scarcity have been considered as key drivers of transnational land investments (Anseeuw et al., 2012). In fact, the availability of water resources determines land productivity, and is thus an important driver of investments in farming land.

To test the above assumption, Fig. 9 investigates the relationship between natural resource endowments in the major European and global investor countries to understand the extent to which land and water scarcity can be considered as drivers of land acquisitions. The figure shows land and water scarcity indices, namely, the suitable land already in use and the water available in the investor countries, based on the calculation explained in the Section 2. The dimensions of the bubbles indicate the land acquired by the investor countries, accounting for 80% of the total of acquired land of the deals in operation and/or concluded at the global level. About 28% of the realised land agreements (in acreage) involve also investors from the targeted countries. Three groups of investors can be identified based on their availability of land and water resources:

- **Resource-abundant countries:** These countries include countries on the right-hand side of Fig. 12, i.e., Canada, Brazil, Liberia, Cambodia, Argentina, Finland and Guinea but also Sweden and Austria. The area of land acquired by these countries is relatively low compared with other investors.
- **Moderately resource-abundant countries:** This group includes almost all the EU countries except Sweden, Austria, Denmark and Spain. The USA, i.e., the biggest investor at the global level, is also in this group. Factors other than a natural-resource deficit, including policy-driven interests, are argued to be the drivers of 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 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. UAE, Saudi Arabia and India invest (mainly or exclusively) outside their boundaries mainly for the production of foodstuff. Malaysia's investments are instead primarily meant to produce oil palm. Indonesia is involved mainly in land deals within its own boundaries for the production of oil palm and, to a lesser extent, sugar cane.

Apart 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* group). This finding seems to confirm the fact that natural-resource scarcity is a fundamental driver of the current rush for land. These types of investment are likely to expand in the future, since in those countries resource scarcity will persist and could also be exacerbated due to climate change (IPCC, 2013).



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	

Fig. 9. 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.

Source: Authors' elaboration (FAO, 2014; Land Matrix 2013; FAO, 2012a,b; FAO, 2009) *Note*: The vertical axis displays the suitable land already in use (ratio between the cultivated land and the high and moderately suitable land under rainfed and/or irrigation conditions). 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 (water available with respect to the threshold of water stress of 1700 m^3 per capita per year). 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).

The analysis also shows that the investments pursued by EU investors seem to be driven, to a greater extent, by the attempt to comply with the EU energy policy targets than to respond to local deficits of land and/or water, as opposed to the other global investor countries. This result is consistent with other studies focusing on the impact of European policies, especially renewable energy poli-cies, on land deals (Friends of the Earth Europe, 2014; Von Witzke and Noleppa, 2010). These types of investment, especially those classified as intended and therefore not yet concluded, are poten-tially reversible if, for instance, new policies on responsible and more sustainable land investments are introduced at the EU and/or at the country level.

Some efforts in this direction are already indicated in EU directives and recommendations. The RED, for instance, establishes that bilateral and multilateral agreements with third countries have to comply with sustainability criteria, especially concerning biofuels production. The directive also establishes that, when these agreements are concluded, a special consideration should be given to issues of basic ecosystem services 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; ensuring 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 (RED, 2009/28/EC).

The EU has also encouraged member states to adopt the FAO Voluntary Guidelines on the Responsible Governance of Tenure (FAO, 2012a). 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 protecting the land-use rights of small local farmers, especially in countries where land acquisitions have happened at an alarming extent over recent years, such as in Africa (EU, 2011).

The role of energy and agricultural policies on land acquisitions: a review

A number of different factors have been highlighted in the literature as drivers for the increased demand for land by the EU member states, namely, energy and agricultural policies promoted at the EU level (Cotula et al., 2008, 2014; GRAIN, 2013; Liu and Herre, 2013; Cotula, 2012; Borras and Franco, 2011; EuropAfrica, 2011; Graham et al., 2011; Franco et al., 2010). In relation to energy, policies set

Table 1
Biofuels production, import, export and consumption – EU (27 countries) (thousand 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 (based on Eurostat, 2013)

at the EU level have been the key drivers for the expansion of the production and use of renewable energy by all member states over the past few years (Friends of the Earth Europe, 2014). The EU RED establishes that, by the year 2020, 20% of the energy used in the EU as a whole and 10% of each member state's transport fuel (RES-T target, renewable energy resources applied in transport) must originate from renewable sources (RED 2009/28/EC).

Policies and instruments implemented by the member states to reach RES-T targets are almost completely aimed at biofuel deployment (EREC, 2013; Hamelinck et al., 2012). As a result, production and consumption of biofuel in the EU have increased in the last years, as shown in Table 1.[5] For 2012–2020, the OECD-FAO Agricultural Outlook (2013) estimates an increase in consumption of biodiesel and ethanol higher than production, so this must be met through the increase of imports from non-EU countries.

It has been estimated that to reach the EU mandate in transport, land use requirements for biofuels will increase by 130% between 2010 and 2020, corresponding to 11 million ha of agricultural land around the world (De Schutter and Giljum, 2014). The study also predicts that the mandate will be satisfied mostly by first generation biofuels and, more specifically, using wheat, maize and sugar beet for ethanol and rapeseed, soy and palm oil for biodiesel. More-over, while cropland expansion will remain under 6% in Europe, Latin America (mainly Brazil), the CIS (Commonwealth of Inde-pendent States)[6] and Sub-Saharan Africa will be the most affected regions (Laborde, 2011).[7]

Since the use of food crops for biofuels (i.e., first generation biofuels)[8] has been linked to deforestation, rising carbon emissions, food insecurity and land acquisitions in the developing world (Friends of the Earth Europe, 2014), the EU Council has recently reached an agreement (as of June 2014) on the Commission proposal amending the Renewable Energy (2009/28/EC) and Fuel Quality Directives (2009/30/EC), including the following sustainability measures: (i) the use of biofuels from food crops are limited to 7% to meet by 2020 the EU 10% targets for renewables in transport; (ii) promotion of the transition to second and third generation ('advanced') biofuels, through incentives and an indicative non-binding sub-target for advanced biofuels; (iii) Indirect Land Use Change emissions (ILUC) reporting on greenhouse gas emission savings from the use of biofuels will be carried out by the Commis-sion based on data reported by member states. The ILUC policy aims to reduce greenhouse gas emissions from land use changes induced by the expansion of biofuels, especially in relation to forests and pristine lands converted to cropland (Ecofys, 2012; Al-Riffai et al., 2010). In addition, the Commission is of the view that in the period after 2020 biofuels should be subsidised only if they lead to substantial greenhouse gas savings and are not produced from crops used for food and feed (Dunmore, 2012).

These changes in the European legislation may lead to faster development of large-scale advanced biofuels trade and severely limit the growth of EU imports of feedstock for biofuels production, as currently the majority of EU transport energy already comes from food-crop-based biofuels (Lamers et al., 2011). Yet, in relation to the development of second generation biofuels, it is too early to appreciate the consequences of the above mentioned EU policies, since predictions about the developments and use of second gen-eration biofuels by 2050 are still highly uncertain, as they depend on specific policies, trends in fossil fuel prices, investments and developments in technologies and their application (REN21, 2013).

In relation to agricultural policies, Europe is the continent that is most dependent on the 'virtual import of land' for food production and forestry purposes. It has been estimated that almost 60% of the land is required to meet the EU demand of agricultural and forest products come from third countries outside Europe (Friends of the Earth Europe, 2011; Von Witzke and Noleppa, 2010). It has also been estimated that the EU livestock industry imports around 75% of its feedstock (Liu and Herre, 2013). The development of the Common Agricultural Policy (CAP) tends to be trade promoting and therefore supporting the import of food commodities and feedstock from third countries through: (i) the promotion of agricultural trade liberalisation; (ii) the increase in the competitiveness of the agribusiness sector (mainly through direct support measures for the livestock industry, thus promoting exports of dairy and meat products partially supported by the import of non-European feedstuffs)[9]; (iii) the decline of the EU incentives on agricultural production[10] (FIAN, 2012; Fritz, 2011; Von Witzke and Noleppa, 2010).

Purpose of investments: food, agro-fuel and flexible crops

To better understand the main drivers of EU land acquisitions, eventually linked to specific EU agricultural and energy policies as explained above, this section describes the purposes of the land deals realised by the EU countries and reported in the Land Matrix database as 'agricultural'. The analysis is conducted for the concluded, in operation and intended land deals. To determine the final use of the land under acquisition, i.e., food, biofuel or industrial, the

[5] For more details on the biofuels market in Europe, see Antonelli et al. (2015).

[6] The CIS is a regional organization formed by post-Soviet states: Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

[7] If we look at the trade effects on feedstock imports, the EU imports of rapeseed, palm oil and soybean will increase. Moreover, in the case of trade liberalization policies, this will lead to an increase in sugar cane ethanol imports and a decrease in maize imports (Laborde, 2011).

[8] Sugar and starch crops (for ethanol) and oilseed crops (for biodiesel) are 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, ligno-cellulosic biomass and industry waste (woodchips, skins and pulp).

[9] Feedstuffs for the livestock industry are by far the most important agricultural commodity imported into the EU. While a large amount of the diary and meats products produced in Europe is exported to developing countries (Fritz, 2011).

[10] Rather than ensuring a fixed price for agricultural products, the CAP today focuses on supporting farmers' income directly and independently from production. This change has been introduced by the CAP because the presence of fixed prices and product support led to feedstock overproduction in the European territory and therefore to a distortion of the world food market (Agricultural Policy Perspectives Briefs, 2011). However, it has been argued that this change in the CAP policy could also lead to a decrease in feedstock production within the EU territory, thus also promoting feedstock import from third countries and the acquisitions of foreign land (FIAN, 2012; Fritz, 2011; Von Witzke and Noleppa, 2010).

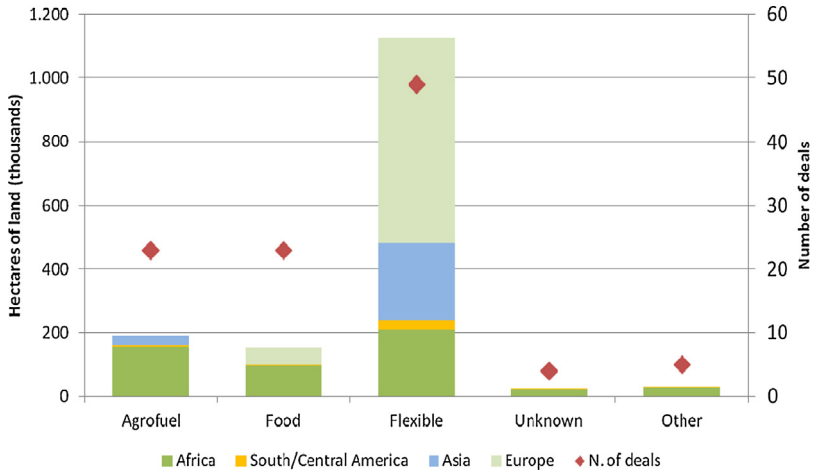


Fig. 10. Purposes of land deals in operation for targeted regions, number of deals and hectares of land (in thousands). Source: Authors' elaboration (based on Land Matrix as of 16 October 2013)

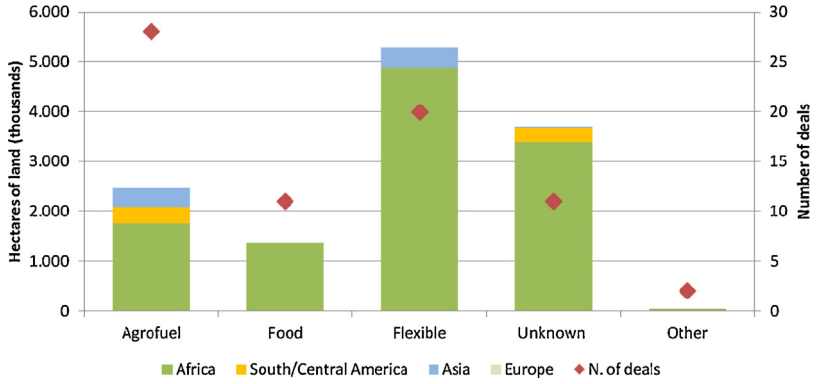


Fig. 11. Purposes of concluded land deals for targeted regions, number of deals and hectares of land (in thousands). Source: Authors' elaboration (based on Land Matrix as of 16 October 2013)

analysis has been based on a triangulation of the information on the crops grown on the land with the business activities of the companies involved in the land agreements, as explained in the Section 2.

Figs. 10–12 show the purposes of EU land deals in operation, concluded and intended, for targeted regions, number of deals and hectares of land, respectively. As shown in Fig. 10, the produc-tion of flexible crops account for the largest share of total deals in operation (46%), followed by agro-fuel (23%) and food (22%). In rela-tion to the concluded deals, the production of agro-fuels accounts for 39% of the total reported deals, followed by flexible crops (28%) and food (18%).[11] However, for concluded deals the amount of land used for flexible crops is higher than agro-fuel and food crops.

For flexible crops, it is difficult to distinguish final uses; however, by looking at the land deals in operation through a triangulation of the information provided by Land Matrix, it can be seen that among the 48 deals classified as flexible, 28 are meant to produce food and/or agro-fuel and 20 refer to industrial uses.[12] 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 instead much more common in Asia and Africa with rubber and oil palm plantations, probably due to more favourable climatic conditions.

As previously shown, African countries are the main targets for EU investments in land. Africa is also the continent for which there is less information regarding the purposes of the deals (classified as *unknown*), especially in relation to concluded deals (Fig. 2). Gath-ering more information on the unknown deals in Africa could be helpful to better understand future pathways of transnational land investments in the continent.

Moreover, the trend towards the expansion of land acquisitions by the EU, under the pressure of demand for biofuels is remarkable. As shown in Fig. 3, intended land deals in Africa and Asia by EU investors are in fact mainly driven by agro-fuel demand. However, generally speaking, predictions for the intended land deals are quite uncertain since, for various reasons (e.g., profitability and trends in international markets and domestic demands) intentions may not translate into actual production realities (Cotula et al., 2014).

Finally, the land used explicitly for food production is mainly located in Africa, with a tiny share in Europe, and it is limited when compared with other uses, as shown in Figs. 10–12. However, it could grow substantially in the future in Africa if the intended EU land deals for food translate into production. These results are in line with a recent multi-country study based on global land acquisitions, which predicts an increase in African land deals for food production, linked to the decreasing relative importance of biofuels as a driver of land deals due to disappointing agronomic results (Cotula et al., 2014).

[11] This percentage includes both deals whose purpose is 'food' and 'food and forestry'.

[12] This is the case for instance for the production of oil palm which can be associated with 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.

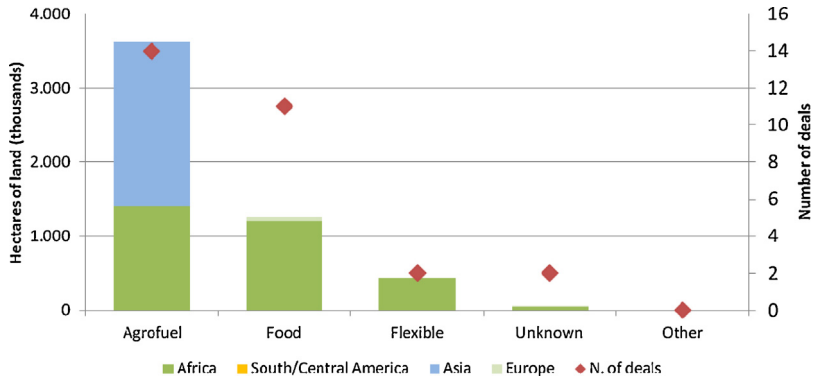


Fig. 12. Purposes of intended land deals for targeted regions, number of deals and hectares of land (in thousands). Source: Authors' elaboration (based on Land Matrix as of 16 October 2013)

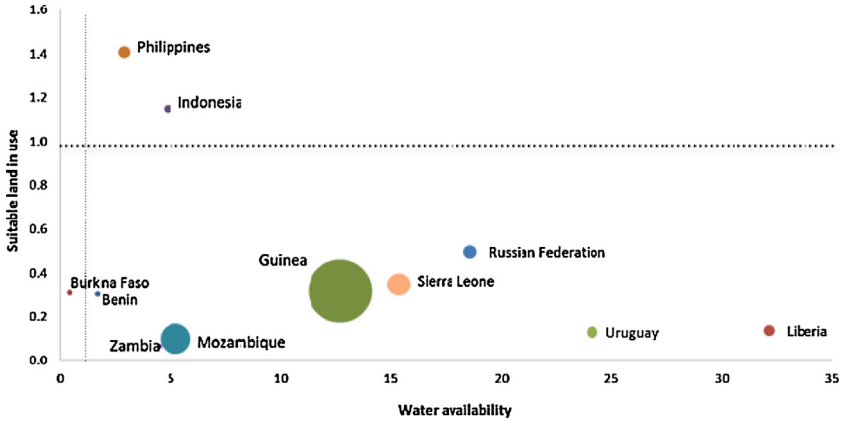


Fig. 13. EU land acquisitions (ha of land) in relation to land suitability and water availability in the most targeted countries (80% of in operation and/or concluded deals). Source: Authors' elaboration (FAO, 2014; Land Matrix 2013; FAO, 2009, 2012b). *Note*: The vertical axis displays the suitable land already in use (ratio between the cultivated land and the high and moderately suitable land under rainfed and/or irrigation conditions). A high value 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 (water available with respect to the threshold of water stress of 1700 m^3 per capita per year). 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).

Potential implications of EU farmland investments for water and land availability in the host countries

In the literature on the potential consequences of land acquisitions in the target countries, land and water resources are indicated as the most vulnerable resources in terms of overexploitation, especially in countries where these resources are already at risk (see for example Schoneveld, 2014; Rulli et al., 2013). Fig. 13 shows the water available and the suitable land already in use in the countries targeted by EU investments. The countries included in Fig. 13 account for 80% of the area involved in concluded and/or in production deals; the size of the bubble indicates the amount of land acquired by EU investors. The agreements in Guinea, Indonesia, the Philippines and Mozambique involve EU countries in partnership with investors from the target countries.

Results show that almost all the countries targeted by EU land acquisitions have a large amount of land of good quality that has not been exploited yet. In fact, most of them show a share of 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. Therefore, land acquisitions in those countries are likely to result in competition among different land uses, resulting for instance in land-use changes from marginal land and forestland into plantation agriculture. These land-use changes might in turn bring about substantial environmental impacts due to a loss of biodiversity and forest cover, as well as the displacement of traditional livelihood activities (Shoneveld 2014). Cases of deforestation related to land acquisitions for biofuel productions by oil palm plantations have been already reported in Indonesia and Malaysia (Friends of the Earth Europe, 2014; Borras and Franco, 2011; World Watch Institute, 2009). Moreover, most of the rural poor in the world, including in the Philippines and Indonesia, live in marginal agricultural lands[13] and forests, which provide support for their livelihoods (FAO, 1999). Land-use changes from subsistence uses to commercial agriculture of these lands could therefore result in negative impacts on resource access and livelihoods for the most vulnerable people.

In terms of the implications of land acquisitions on water resources, among the countries targeted by EU investors in Africa, only two of them – Burkina Faso and Benin – show relatively low levels of water availability. The former is below the identified threshold of water scarcity (1700 m^3 per capita per year), the latter is above the threshold, but water availability is dramatically lower compared with the rest of the countries (Fig. 13). It is noteworthy to

[13] Marginal agricultural land is defined as land currently used for agriculture, grazing and agroforestry that has serious biophysical and socio-economic constraints, such as low fertility, unfavorable climatic conditions, absence of markets and poor infrastructure (FAO, 1999).

Table 2
Level of human development index (HDI)[a] 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%**	

Source: Authors' elaboration

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

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).

say, however, that *economic* water scarcity[14] is found in almost all African countries involved in land acquisitions by EU member states (see Molden, 2007). Again, a further increase in land acquisitions for intensive agricultural production in those countries could result in negative environmental and social impacts related to the already limited water availability and/or access. Nevertheless, if land acqui-sitions provide better jobs and economic opportunities for the local population, economic water scarcity could also be reduced and land acquisitions could therefore result in positive outcomes in terms of development and resource access in the target countries. Yet, this assumption should be tested with specific field studies, since it has also been demonstrated that, in the majority of the cases, land deals entail a conversion from subsistence farming to large commercial agricultural purposes, without a proper consideration of the impacts on local natural resources, food security and resource access of the local populations (ILC, 2011), often result-ing in poor local development and negative impacts on local food self-sufficiency (Schoneveld, 2014; Siciliano, 2014; Vermeulen and Cotula, 2010).

In terms of socio-economic development of the 11 countries most targeted by EU land investments, 64% of them show very low levels of HDI; and only two have a high/very high HDI (Uruguay and the Russian Federation; Table 2). Three of the countries with the lowest levels of HDI – Sierra Leone, Guinea and Mozambique – are also, by acreage, these countries most targeted by EU land acquisitions. Populations of these countries most targeted by EU land investments rely heavily on agriculture for their livelihoods. In the majority of the countries, the rural population represents more than 50% of the total population, especially for African countries (World Bank, 2014). Land expropriation and land eviction of the rural population due to land acquisitions in countries with already low development standards could therefore have negative impacts on rural livelihoods, which in turn could result in an increase in poverty, reduced access to natural resources and food insecurity (Rulli and D'Odorico, 2014; Cotula et al., 2009).

Conclusions

Data on large-scale land acquisitions are affected by a num-ber 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 database used in this study provides the most comprehensive and up-to-date data set available on large-scale investments in agriculture at a 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 acquired land or not is an important step towards a more comprehensive evaluation of land acquisitions that goes beyond metrics based only on a spatial extent (Edelman, 2013).

The present study has assessed the role of the EU in the rush for land that has taken place since the early 2000s. The invest-ments considered include both those involving investors from EU countries only as well as partnerships of investors from differ-ent countries, some of which involve investors from the target countries. 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 limitations of classifications based on looking only at the type of crop grown in the area. Drivers of such acquisitions, namely, water and land resources scarcity, have been explored.

The analysis has shown that EU investments seem to be driven, largely, by agricultural and energy policies instead of resource scarcity. These types of investment, especially those 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 persist or worsen. The study has also shown that agro-fuel production is one of the main drivers for the land acquisitions pursued by EU countries which are already in operation and is the main purpose of intended land deals, especially in Africa and Asia. It has been argued that the introduction of more sustainable EU energy policies could reduce the extent of future 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 by limiting the use of food and feed sources. The need to abandon mandates on the consumption and production of first generation biofuels to reduce the impacts on the prices of foodstuffs and not to jeopardise food security has recently been highlighted by the UN Special Rapporteur on the right to food Olivier De Schutter (2014) and the OECD (2013). In this direction, attempts to reduce the competition between food and biofuel production at the EU level have been recently approved by the European Commission, with the introduction of ILUC poli-cies and more stringent sustainability criteria. However, specific methods to assess the social and environmental sustainability of

[14] Economic water scarcity can be defined as the 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. For more details, see Molden, 2007.

land acquisitions for biofuels production have not been developed yet. It is thus not clear if and how the European Commission will be able to take measures with respect to social or environmental unsustainable land agreements or encourage transparency of the investments. Apart from voluntary-based recommendations, such as the FAO Voluntary Guidelines (2012a), a EU recognised definition of responsible land investments is still missing (GRAIN, 2012).

To conclude, ensuring the adoption of responsible guidelines on land acquisitions by all member states is of paramount importance considering that, as shown in this paper, most of the countries targeted by EU investors are developing countries with a very low level of HDI, which are thus more vulnerable to unsustainable practices. Further research is needed to incorporate consideration of governance factors in determining the impacts of investments on sustainability and the sustainability of investment practices. The study has also shown that some of the targeted countries have scarce suitable land and/or water, and that many of them, especially in Africa, suffer from economic water scarcity, that occurs where water resources are abundant relative to use but malnutrition exists. The development and adoption of responsible land investments guidelines, which include social and environmental sustainability principles, is therefore highly recommended to enhance development in the recipient countries and reduce the environmental impacts of transnational land acquisitions on local natural resources by the EU and other investor countries. Finally, it is also recommended that the implications of agricultural land investments need to be considered when designing energy policies and targets.

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