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# Land access constraints for communities affected by large-scale land acquisition in Southern Sierra Leone

Genesis Tambang Yengoh · Frederick Ato Armah

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**Abstract** While national figures of land availability are used to justify accepting large-scale land investors, not very much is known about the local level realities of land availability. By combining remotely sensed data with fieldwork, system dynamics modelling and qualitative research methods, we examine local level realities of land use and availability in the Malen Chiefdom of Southern Sierra Leone. Here, local communities are experiencing the outcomes of large-scale investments in oil palm for biodiesel and other industrial purposes by the SOCFIN Agricultural Company. We find that beyond agricultural production, there are other land uses that are vital for the socio-cultural, economic and environmental realities of communities. The Company does not respect engagements promised to local people to set aside buffer zones around living areas to serve as biodiversity corridors. Local communities are severely deprived of agricultural land and other land resources. The operations of SOCFIN do not take account of present or future land needs of local people. A baseline requirement of food crop land should be set aside for each community, to ensure the attainment of food security in communities affected by land acquisitions. Such baseline requirement should be augmented with local level needs assessments to meet new demand for cropland necessitated by changing demography.

This model of land planning can be applied to other land use and additional engagements of large-scale land investors.

**Keywords** Land acquisitions · Livelihoods · Buffer zones · Cropland requirements · Land policy

## Introduction

The question of large-scale land acquisition (LSLA) in sub-Saharan Africa has been framed in a plethora of development models. One of the most common and contentious basis for this acquisition has been the erroneous perception that the region holds abundant land resources that are either unused or under-used (Cotula 2009). Terminologies such as available, abundant, unused, underutilized, unproductive, marginal, and empty, have been applied to describe lands in different parts of the developing world as a prelude to their being appropriated for the large-scale biofuel monocultures. These adjectives have been accompanied by descriptions of the future outcomes of such land appropriation, such as that the land will be developed, put to use, invested, made profitable, etc. Such adjectives and future scenarios of the outcomes of LSLA can be easily seen in the environmental and social health impact assessment (ESHIA) documents of large-scale land investment (LSLI) companies and government reports of development futures for regions affected.

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While the practice of LSLA has increased significantly over the last decade, research into the processes at work, the long-term outcomes on national development indicators, and the implications for local communities where these land acquisitions occur has not adequately matched the pace of land acquisitions. National governments have responded with short term unsustainable policies designed to show international financial institutions that they are promoting foreign investments. Such policies generally tend to placate the interests of investment companies over those of local communities, legitimate owners and users of the lands being acquired. International research institutions on the other hand have variously attempted to outline guidelines for the acquisition of land for large-scale biofuel monocultures. Some of these guidelines include those proposed by the United Nations Special Rapporteur on the Right to Food (De Schutter 2009), the FAO (Seufert 2013), and from the joint efforts for institutions such as FAO, IFAD, UNCTAD and the World Bank Group (FAO et al. 2010). With regards to access to land and associated resources by local peoples, these guidelines are unanimous in the observation that respect for the rights of local communities (including rights of tenure and self-determination on the choice of use of their lands) must be respected. The institutions are also unanimous in their observation that the benefits of any alternative land arrangements must benefit local communities in acceptable terms, and that the goal of achieving environmental sustainability should be engrained in all alternative land use considerations.

Notwithstanding the existence of such guidelines, national governments keen to attract foreign direct investment in large-scale biofuel and other industrial feedstock production seem to be quite oblivious of such considerations. Such governments are still keen to identify and allocate to LSLI companies tracts of land that support livelihoods and ecologies in rural areas under the guise that such land is under-utilized (German et al. 2014). Local communities are not equipped to negotiate the implementation of such voluntary guidelines when faced with the overwhelming economic resources and political cloud of large-scale land investors. Land deals in Africa usually involve a range of government bodies and LSLI interests in complicated and multiple processes (Cotula and Vermeulen 2011; Rulli et al. 2013) that the local people (in most cases without high levels of formal

education) may not comprehend. The capacity of local people to bargain at the same level of understanding and make decisions on the acquisition of their lands based on free, prior and informed consent with LSLI companies is low (Vermeulen and Cotula 2010). The role of local administrative institutions and national governments as protectors of the interests of their populations in the face of such unbalanced bargaining power is therefore important. Instead, governments have been found to be acquiescing with LSLIs in appropriating lands from local populations (Matondi et al. 2011). According to Borrás Jr. and Franco (2012), states in many instances have undertaken a range of policy and administrative activities to convert land designated as “scarce” land into productive factors of economic production, irrespective of the prevailing social or ecological character of the land resource.

In Sierra Leone, investments in large-scale biofuel projects are being driven by a government body, The Sierra Leone Investment and Export Agency—SLIEPA (Green Scenery 2011). So strong is the determination to demonstrate that the national government is conducive to foreign investments that SLIEPA joined the Removing Administrative Barriers in Sierra Leone (RABI) programme of the World Bank’s International Finance Corporation (ActionAid 2013). While the World Bank Group holds that RABI exists “*because we all recognized that the private sector is the leader of growth*”, on the ground it seems the need to remove barriers to foreign private sector investments is translating to complacency on the effects of land-based investments in rural Sierra Leone. Nowhere in rural areas affected by LSLA does this complacency seem to be clearer than on the access to land and landed resources by local communities. The process of LSLA in rural Sierra Leone seem to have been implemented without thought of the fate of communities that depended entirely on agriculture for their means of livelihood. For many communities, the outcome has been a loss of land and food sovereignty, as well as access to vital resources on which households depend such as water, forest resources.

The concept of land sovereignty holds that working peoples should have the rights to “*effective access to, use of, and control over land and the benefits of its use and occupation, where land is understood as resource, territory, and landscape*” (Borrás Jr. and Franco 2012). Land sovereignty has the potential of influencing the base of food production and food sovereignty

in rural communities (McMichael 2014). Besides having the potential to feed into social strife, this undermining of local food sovereignty has the potential of reducing the resilience of local communities to global environmental shocks such as climate change (McMichael 2014). In Sierra Leone rural areas produce a vast majority of the food consumed in urban centres (WFP 2008). Undermining the food sovereignty of rural areas can therefore have outcomes for populations and livelihoods far beyond the geographical limits of these food producing zones. In Southern Sierra Leone, reports from local communities and civil society organizations repeatedly describe a systematic erosion of these rights.

#### Description of the study area

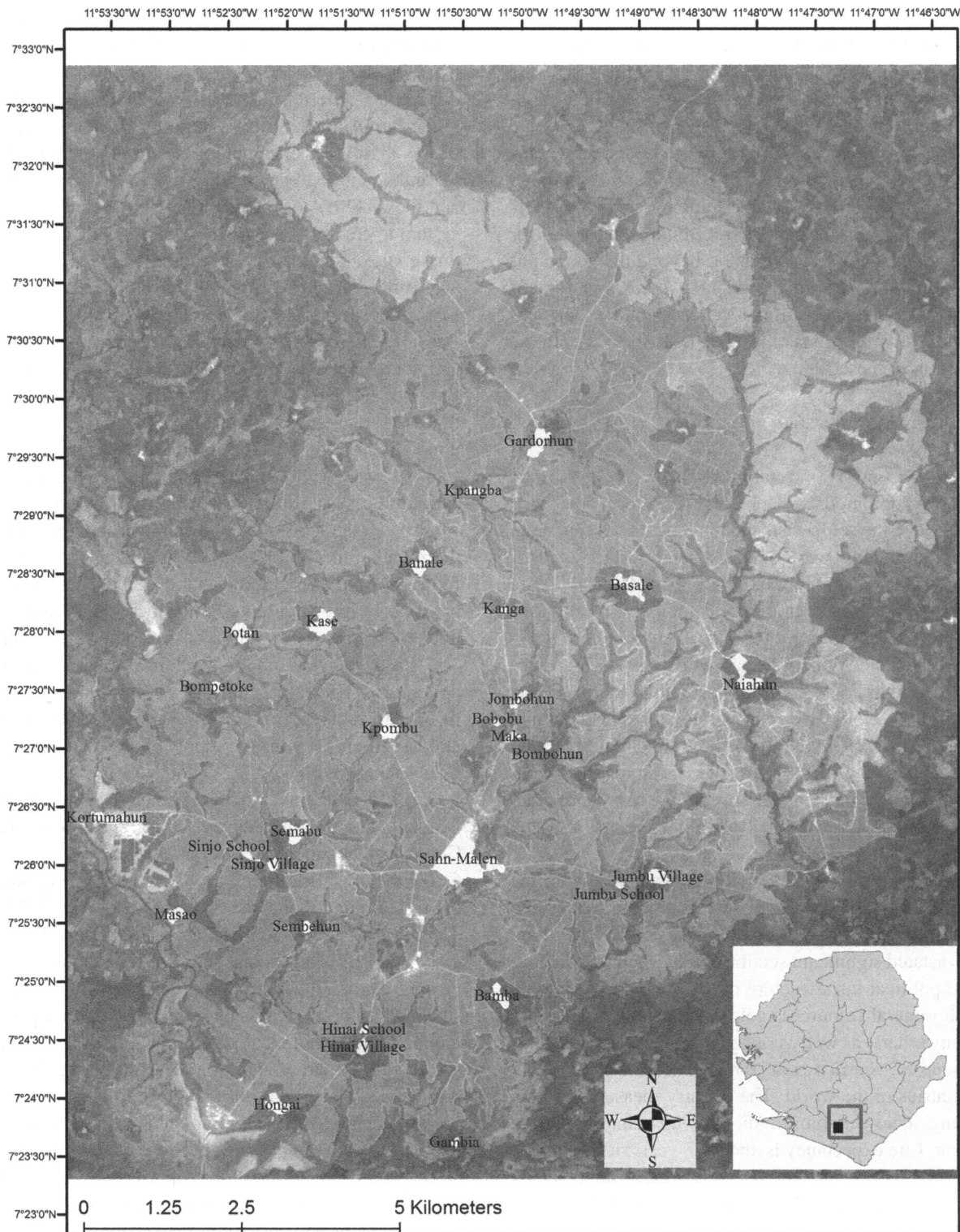
Sierra Leone is a relatively small West African country bordered by Guinea in the north and east, Liberia in the south east, and the Atlantic Ocean in the west and south west. It has a land surface area of 71,740 km<sup>2</sup> and a population of about 6 million. The country is divided into four administrative regions (Northern Province, Eastern Province, Southern Province and the Western Area) which are further subdivided into fourteen districts. While Sierra Leone enjoys an ethnic diversity of up to sixteen ethnic groups, the *Temne* in the north of the country and the *Mende* in the south are the most predominant. Religious co-existence between the Moslems that make up the religious majority in the country, and the Christians is very strong.

Since Sierra Leone gained independence from the British in 1961, the country's recent history has been marked by an 11-year (1991–2002) civil war which devastated significant sections of the social, economic and political infrastructure of the country. Despite its rich mineral resources (gold, diamonds, bauxite, and many others) as well as riches in fertile soils and water resources, Sierra Leone remains one of the poorest countries in the world. The country measures low on many socio-economic indicators of human development. Life expectancy is about 47 years; it is 180 (out of 187) in the Human Development Index rank with an HDI score of 0.336; has a low rating (of 0.304) in the UN Education Index; a low GDP per Capita of USD 827; and GINI Index of 42.5. Poverty in the country stands at about 76.1 %. The low levels of socio-economic indicators are attributed to a number of

causes, chief among which is the “*high level of impunity for officeholders and other state actors ... when it comes to arbitrariness, maladministration and corruption*” (Bertelsmann Stiftung 2012). According to the Bertelsmann Stiftung Report (2012), the effects of this high level of impunity is further strengthened by underqualified personnel, gross gender inequality, and the inability for the resource-constrained judicial system to credibly enforce the rule of law. It is within this context that many agricultural large-scale land acquisitions and investments have taken place in Sierra Leone over the last decade.

The Malen Chiefdom (Fig. 1) is one of twelve Chiefdoms in the Pujehun District in the Southern Province of Sierra Leone. It is a rural area situated to the west of Pujehun Town and has an estimated population of 23,520. Agriculture has been the mainstay and way of life of the population of the Malen Chiefdom. As with the rest of the rural areas of the country, it is practiced by, and employs about 97 % of the population (WFP 2008). While rice is the main food crop cultivated, this area has had the reputation of producing and supplying both local and national markets with palm oil and a host of other tree crops. The local population practiced low external input agriculture. Food crop farming was combined with fishing from local streams to make the Chiefdom almost self-sufficient in the supply of basic food needs.

In 2011, the Socfin Agricultural Company Sierra Leone Ltd (a member of the French Bolloré multinational, henceforth referred to as SOCFIN or the Company) obtained a lease of 50 years to exploit 6,500 ha of fertile land in the Malen Chiefdom (Mousseau and Schaefer 2012; ActionAid 2013). The lease has the potential for an additional 21 year extension and an additional 5,000 ha to be added to the original land acquisition. As the conversion of local small-scale food crop farms into large-scale oil palm monocultures started, local populations and civil society groups drew attention to a host of problems that needed to be addressed to ensure that there was social, economic and environmental sustainability in the land acquisition process. These issues included among many others lack of proper consultation and transparency of land transactions, poor representation of local communities in fora where decisions were being made on the acquisition of their lands, issues with compensation for land loss as well as fair compensation for the loss of some important economic



**Fig. 1** Location of the Malen Chiefdom in Southern Sierra Leone and communities studied. The communities are overlain on high resolution satellite data of the study area

assets on the land (economic trees), corruption and intimidation of local people to sign land lease agreements (Mousseau and Schaefer 2012).

Since the Socfin Agricultural Company Sierra Leone Ltd launched operations in the Malen Chiefdom, there have been widespread reports of destruction of natural resources (rivers, streams, forests, wildlife) and the associated livelihoods and environmental services they support. The company has been embroiled with civil society organizations such as Green Scenery and representatives of the Malen Affected Landowners' Association (MALOA) in legal disputes—in what has been described by observers as attempts to silence criticisms of its activities (Mousseau and Schaefer 2012). The company on its part claims that it is making vital investments in the agricultural sector of Sierra Leone. It holds that these investments (expected to total 112 million USD) would create over 10,000 new jobs and contribute to the improvement of vital local structures such as hospitals, roads and schools (Star Consult 2011). Central to this legal dispute is the issue of land sovereignty, which in turn is linked to food sovereignty.

### Study objectives

Evidence on whether differences in land tenure are important for preventing land grabs is still thin. Further evidence on whether formalised customary land recognition is important as a means of protecting land against grabbing is still needed, as is evidence on whether formal recognition of customary-held lands affects responsibilities of companies to undertake consultation with local communities prior to making investments, which would lead to more equitable investments. In relation to the link between strengthened property rights and investment, further disaggregated country studies, focusing at the subnational and national level are needed in order to clarify the importance of titling in specific situations. This paper makes a significant contribution to this gap in the literature. We pay particular attention to the levels of economic development, role of institutions as well as local land tenure contexts, and avoid aggregating findings across diverse contexts, where they lose granularity. Our drive for a local level analysis of the facts, drawing from household and community experiences to identifying problems specific to a spatial,

temporal, and politico-social context stems from recommendations for “*more specific, grounded and transparent methods*” in the study of LSLA recommended by Scoones et al. (2013). Wolford et al. (2013) stress the need to “illuminate the micro-processes of transaction and expropriation” as one of the key basis for understanding the specific nature and processes of LSLA for specific case studies. This study set out to achieve four aims:

1. Identify the main land uses in rural Sierra Leone and establish their importance to the socio-cultural and economic local communities.
2. Examine the implementation of the 500 m buffer zones around communities affected by large-scale land acquisitions (particularly the extent to which their implantation is respected by SOCFIN).
3. Estimate current and future land requirements for communities for meeting the most basic requirements of food and nutrition security
4. Propose a way forward in addressing shortcomings related to community access to buffers around living areas and farmland for food production for people affected by LSLA.

### Methods

An initial fieldwork was carried out to assess which communities could be representative for a study of the problems of access to land and related resources in the Malen Chiefdom. During this fieldwork, open interviews with community members were randomly administered with the goal of ranking communities on the basis of the types of problems associated with access to land and land resources. For example, communities where access to water resources was their main concern would be distinguished from those in which access to farming land was their main concern. Categories such as water, farmland, forest resources, fishing grounds, etc. were used for this categorization. No communities stood out for specific categories of challenges. Instead, all categories of problems seem to be present and important for all communities sampled. Based on this outcome, we sampled 25 of the 36 villages in the Malen Chiefdom. In our sampling, we favoured communities that were more easily accessible from Sahn-Malen, the headquarters of the Malen Chiefdom (Fig. 1), communities

for which there was data on some of the main variables of interest such as total population and number of households; accessibility; and knowledge of the area by our resource persons.

#### Fieldwork, questionnaire administration and focus groups

Fieldwork for this study was undertaken in two phases. The first phase of fieldwork was carried out in October and November 2013, and was designed as a broad-based investigation to explore some key outcomes of LSLA and investments in rural communities of Sierra Leone. During this phase, two main activities were undertaken:

- (1) A survey of the outcomes of LSLA was carried out using structured questionnaires. These questionnaires were administered by enumerators through interviews of household heads (males and females together) in their homes. Questionnaires are diagnostic tools frequently used to gather data for a range of assessments, and their effectiveness can be increased when combined with interviews (Harris and Brown 2010). The enumerators received two-days of training in the administration of the questionnaires. All enumerators were drawn from the local area and the questionnaires were administered in the local language (*Mende*). The questionnaires gathered information on households' characteristics (such as size, age of family members, level of formal education); sources of household income; changes in the amount and quality of land assets over the last 5 years; outcomes of LSLA on household welfare such as employment opportunities, access to land and associated resources.
- (2) In each community where questionnaires were administered, focus group sessions were organized to gain common insights on the views and experiences of communities regarding the outcomes of LSLA. Participants in these focus groups were members of each community in which the study was undertaken. These focus groups also served as a good platform to obtain different perspectives about the same issues on LSLA (Krueger 2009). During focus groups, some of the main trends that were observed in an initial analysis of questionnaires were put

forward for discussion. The focus groups were organized around three main themes: gender (particularly women's issues); youth and employment; as well as on the outcomes of LSLA on environmental resources. The latter focus group turned out to be unifying of key issues discussed in other groups, bringing together themes such as the fall in food self-sufficiency, loss of farm employment and related fall in household income, issues with access to and state of employment in the local land investment company, gendered differentiated scale of LSLA impacts, and the non-respect and insufficiency of the promised 500 m buffers around communities. While no specific attempt was made by the researchers to control participants who took part in groups of specific themes, the tendency was that women tended to participate in the gender theme, while youths (18–40) populated the youth and employment theme. The theme on environmental resources was heterogeneous in terms of age group and gender. The focus of this paper is chiefly on outcomes from this focus group (that of the outcomes of LSLA on environmental resources), where among other things, one of the main issues that arose was the non-respect and insufficiency of the promised 500 m buffers around communities.

Constant comparison analysis was used to analyse data derived from these focus groups. This method of analysis involves three steps. Firstly, the data are disaggregated into small units in which descriptors or codes are attached to each of the units. Next, the codes are grouped into categories according to the themes they expressly characterize. Lastly, themes that express the content of each category are developed. The choice of constant analysis over other methods of analysis was mainly because there were multiple focus groups within the same study in the Malen Chiefdom (Onwuegbuzie et al. 2009).

#### Examining current land-uses and requirements

##### *Evaluating and geo-tagging land uses*

The second phase of field work was undertaken in January and February 2014. The goal of this exercise

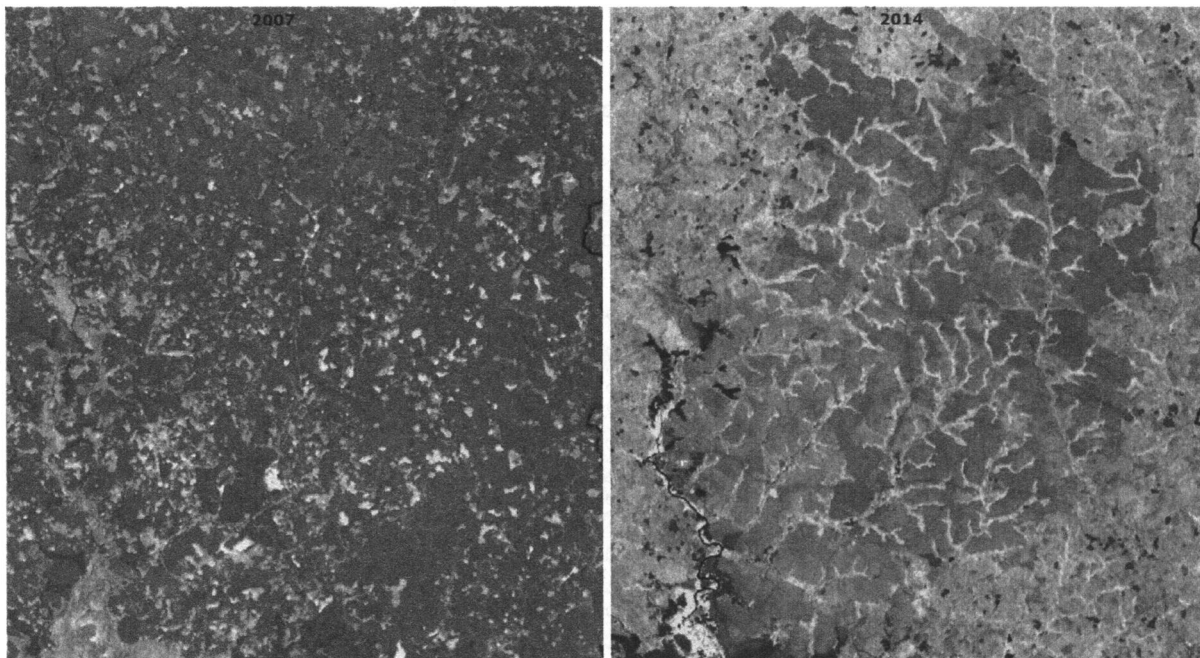
was to identify and establish the typology of land uses common to communities in the study area and to establish the role played by these land uses in the socio-cultural and economic lives of communities. Members of the communities identified existing land uses and explained their importance. In each case the land use was geo-tagged using a hand-held GPS and associated metadata acquired. The purpose of this geo-tagging was three-fold: (a) to make a spatially explicit inventory of land-uses for these communities as a basis for understanding the land-use pressures and land needs being discussed by community residents; (b) to provide control-points for the digitization of habitable areas before computing 500 m buffers; and, (c) to derive land uses for the validation of land use classifications for the study. Changes in these land uses and associated impacts on communities were also discussed and recorded during focus groups. Trips were made to areas where local residents showed non-adherence of SOCFIN to the promise of maintaining a 500 m buffer around communities.

#### *Geoprocessing of remotely sensed data*

Satellite data for the study areas was extracted from Bing Maps Imagery using GIS Cloud Map Editor®. Data for areas where recent development have not

been updated by world imagery were derived from Google imagery. The data from Bing Maps Imagery is 0.2 m resolution and Google Earth Maps has a resolution of 0.65 m pan-sharpened. These data use the Mercator Auxilliary Sphere projection and the GCS\_WGS\_1984 Geographic Coordinate System. In ArcGIS 10.0, the different sections of data were georeferenced and given the Projected Coordinate System of WGS\_1984\_Complex\_UTM\_Zone\_28 N, using the Transverse\_Mercator\_Complex projection with Geographic Coordinate System GCS\_WGS\_1984. These different datasets were combined in a managed raster catalogue where the geo-tagged reference points of land-uses were superimposed on the satellite image to guide manual digitization (Allen 2010). 500 m buffers were created around communities to indicate areas that should potentially be left as buffers by the SOCFIN Company (Fig. 5). The use of high resolution imagery and control points to guide the digitization process improved the accuracy of digitization (Tong et al. 2009). The extent of encroachment of local companies into mandatory buffers is calculated by subtracting the area of the mandatory buffers from the areas of existing buffers (Fig. 5; Table 1).

An analysis of land-use change before and after land acquisition makes use of data from the Landsat Archive of the U.S. Geological Survey Earth



**Fig. 2** Band combinations prior to supervised classification—432 for Landsat TM and 753 for Landsat 8



Resources Observation and Science Center (Fig. 2). For the dataset showing the landscape before transformation by LSLA, a Landsat Thematic Mapper (TM) image taken on the 1st of January 2007 is used. This data is derived from instruments onboard the Landsat 4 and 5 satellite. Landsat 4–5 TM image data has seven spectral bands with a pixel size of 30 m. The data used to illustrate land-use change resulting from transformation by LSLA is from the Operational Land Imager (OLI) and Thermal Infrared Sensor (TIRS) instruments onboard the Landsat 8 satellite. The date of acquisition of the image was 30th March 2014. The 16-bit data product from Landsat 8 has nine bands and is particularly suited for a range of environmental studies. The path and row for both images is 201 and 55 respectively and the scene size is 170 km north–south by 183 east–west. The level of treatment of the data prior to use in this study is Level 1T, indicating that the data have undergone radiometric and geometric correction by incorporating ground control points using a Digital Elevation Model.

To minimize differences in phenological abundance, images used were taken in the dry season of the study area (Fig. 2). The red, green blue (RGB) band combination used to render the color composite for the

Landsat TM image (2007) is 4, 3, 2 to distinguish areas that have been farmed during the time of the image capture from the unfarmed (but vegetated) areas. The areas that had been farmed (soil exposed as they were prepared for planting) stood out against the red color of the vegetated area in the false color composite. For the Landsat 8 image (2014), the RGB band combination used is 7, 5, 3 to get a natural colour image in which exposed cultivated areas and inhabited areas stand out in shades of pink against the sharp green of the surrounding vegetation. While this clearly distinguishes cultivated areas of the oil palm plantation against the rest of the areas, it does not distinguish between exposed cultivated areas by small-holder farmers and the plantation (Fig. 2). The derived composite is pan-sharpened by incorporating it with the panchromatic band (8) to derive a new composite.

Modelling

System dynamics deal with phenomena that change over time and involve interrelated components (Deaton 2000). Using this modelling framework, the underlying functioning of systems can be better understood and future outcomes predicted (Deaton

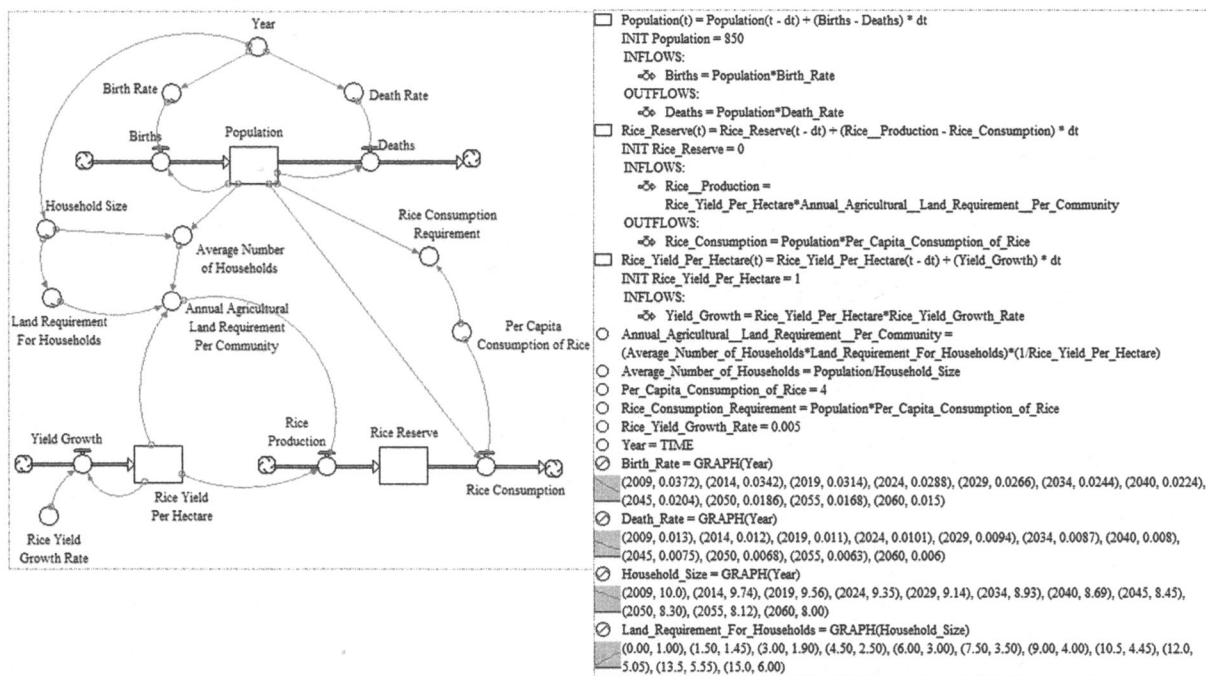


Fig. 3 Structure of the system dynamics model built using Stella© software

2000). A system dynamics model is used to estimate the future population and land requirements for environmental service zones and food production of communities in the study area. The model is built using Stella software 9.1©. The model uses as a baseline, the population, household size and land requirements of 2009. Population data for the base year is derived from surveys carried out by the Against Malaria Foundation <http://www.againstmalaria.com/> and data from the SOCFIN Agricultural Company. The births and death rates are derived from the 2008 Sierra Leone Demographic and Health Survey carried out by IFC MACRO Inc. in conjunction with Statistics Sierra Leone and released by the Ministry of Health and Sanitation in 2009 (SSL and MOHS 2009). Using the land requirements computed per average household as a guide, the land requirement for households is set to 1 acre for a household size of 1 person and progressively to 6 acres for a household of 15 individuals.

The future evolution of birth and death rates were derived from the Pardee Center for International Futures at the University of Denver ([http://www.ifs.du.edu/ifs/frm\\_CountryProfile.aspx?Country=SL](http://www.ifs.du.edu/ifs/frm_CountryProfile.aspx?Country=SL)). They forecast that crude birth rates for Sierra Leone are going to fall from 35.83 in 2014–14.86 per thousand in 2060. They also forecast a fall in crude death rates from 13.45 in 2014–6.87 per thousand in 2060. In the model, an assumption of a fall in the household size of 22 percent over 50 years is made for each community. The model is run on a 1-year time step for 50 years (excluding the base year, 2009),—hence from 2010 to 2060. 50 years is taken as the length of period for which the model is run because this is the reported initial lease period of the SOCFIN Agricultural Company in the Malen Chiefdom.

## Results

### Land uses and land use change in rural Sierra Leone

From an observation of the satellite imagery, these communities appear as islands of habitation in seas of SOCFIN palms. The dotted structures of communities and scratchy buffers around them are occasionally

broken by swamps on which communities perch precariously, or which link communities to each other.

### *Land uses in rural Sierra Leone*

Seven main land-uses are identified (in focus groups) and common for all of the communities in the study area. These include:

**Habitation** Residential area of communities. The sizes of habitable areas vary with communities. The common complaint from residents of all communities is that they do not have space to build new houses or ground for children to play. Questions about where the future generation will build homes and farm are rampant.

**Environmental service zones** We take this to refer to the area around communities (or even around individual homesteads) which, though unoccupied by habitation or gardens is vital for a healthy lifestyle in the community or homestead. Such area is used to hang laundry, serves as a buffer between homes and latrines, serves as playgrounds for children, serves as roaming area for domestic livestock, and harbours trees that provide shade for outside relaxation and other outdoor activities. It was found to commonly extend up to about 20 meters from houses.

**Burial grounds** Specific areas are designated as burial grounds. It exists close to residential areas of communities. Where it is spared during land acquisition, it is taken to be part of the buffer zone by SOCFIN. It is one of the areas of active land-use for communities. Questions about the availability of future sites for burial for the next generation are also being raised.

**Farmland** Farmland is almost non-existent in most of the communities affected by land acquisition in the Malen Chiefdom. There are many categories of farmland, such as upland farm, boliland, backyard garden. Local residents have had to seek farming areas in other chiefdoms or communities where farmland may still be available (which entails contending with longer distances to farms and less favourable conditions of farmland occupation from new landlords). Seasonal farming activities have been

squeezed into the swamps where available. A majority of residents do not have farmlands at all in these communities where farming has been a way of life for generations. It is one of the most important land-use for which questions are being raised about the implications of land acquisition for future generations.

*Fallow bush* Is an essential component of the farming system and livelihoods in rural Sierra Leone. With regards to farming, fallow bushes serve as soil nutrient regeneration systems that support the low external input farming lifestyles of households and communities. When land is left in fallow, these lands are not idle or useless—they are planted with fruit trees and other non-fruit economic trees. They become vital sources of household income to support a range of needs for small-holder households. Fallow bushes are also biologically rejuvenated/fertilized bushes lacking agro chemicals of any sort; making crops produced on the land very healthy. These fallow bushes are in most cases referred to be individuals and institutions with unscrupulous intentions as abandoned, empty, unused, etc.

*Men's and women's sacred forests* These sacred forests are always separated for men and women. They are reserved, vitally important land uses within communities for men and women to converge to inform each other of developments in the community. Such forests are used to plan development paths and strategies, as well as contributions that may come from the different gender groups in such efforts. Activities demanding meeting in these reserved locations include initiation into local men's or women's groups and societies, decision making on issues of relations with other communities, ceremonial performances relating to death and other ceremonies, settling confidential disputes between members in the communities and/or between the community and other communities, strategizing on key development paths for the community. These forests are therefore important for socialization within the genders. The collection of firewood and other activities such as hunting are not allowed in these forests.

*Swamps* Swamps are a common feature of community landscapes in Malen. This is especially so because (where they cannot be converted to oil palm plantations), they tend to be the most visible

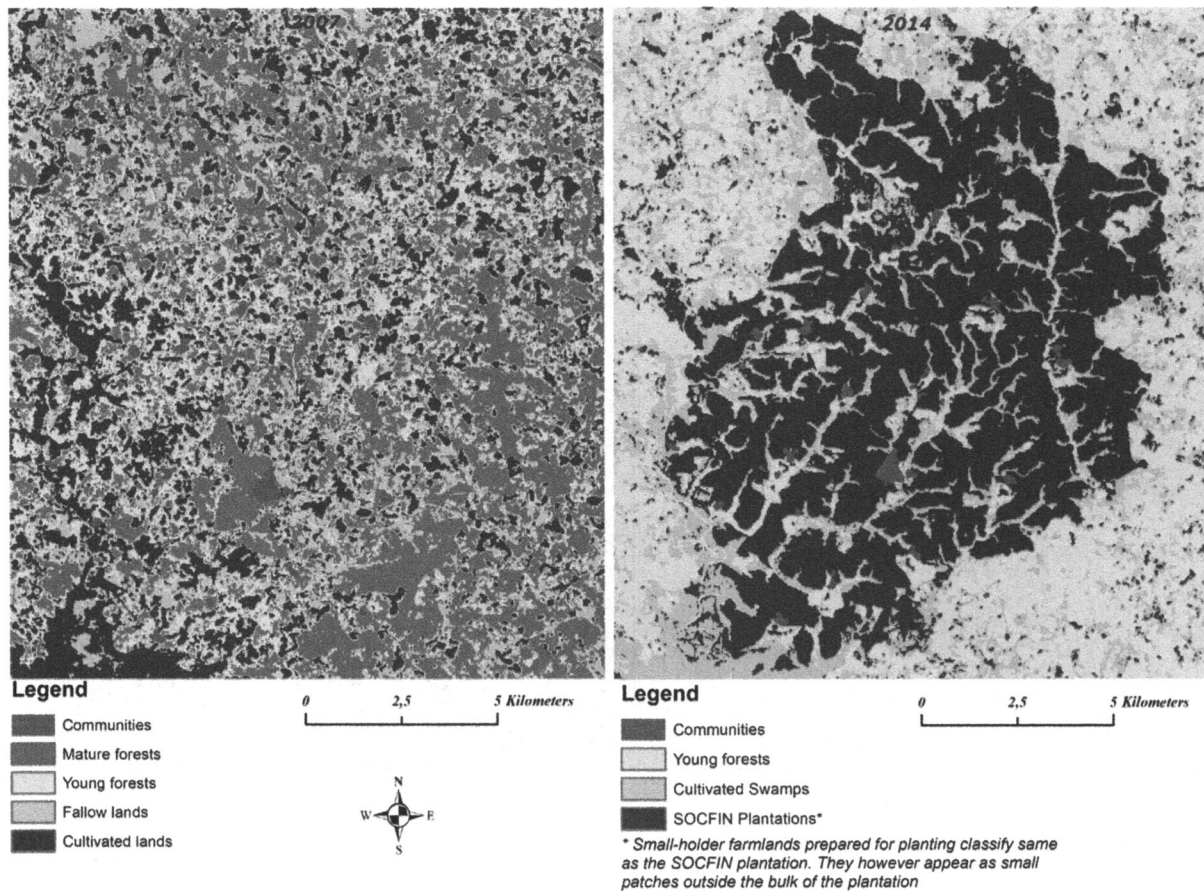
portions of land left near communities. Most communities tended to be sited near sources of domestic water (streams), leaving drier land for agriculture. With the farmlands presently appropriated for large-scale oil palm plantations, the communities are now confined to locations near swamps. The streams and swamps were used (prior to SOCFIN operations) both as sources of water for domestic use and fishing activities. While they remain the main sources of water for most communities, locals claim that the quality of most of these waters and their fishing potential have been jeopardized by the operations of SOCFIN. This was keenly pointed out in communities such as Sinjo and Massao. Focus groups in Jumbu also reported that rice currently produced in existing swamps is blighted—a situation that did not exist before the onset of industrial scale use of agro-chemicals by SOCFIN.

#### *Land use change from 2007 to 2014 in the Malen Chiefdom*

From 2007 to 2014, substantial land use changes have taken place in the study area as a result of LSLA (Fig. 4). In 2007, local communities in the Malen Chiefdom and surrounding villages cultivated approximately 3,000 hectares of food crop farmland. In 2014, the total amount cultivated fell to <1,000 hectares. Within this period, the SOCFIN Company initiated and developed its oil palm plantations which currently occupy more than 6,500 hectares of land. Besides the food crop farmland of local communities that have been converted during this period into oil palm plantations, LSLA has led to a significant loss of the mature stands of forests that existed in the area. In areas that have not been occupied by oil palm plantations, such mature stands have been replaced by forests that can be described as relatively young, since resource pressure from local populations is currently eroding most mature characteristics of these forests.

The 500 m buffers around communities are not respected

During the months of January through March, small-holder farmers prepare their farms for the cultivation of food crops during the rainy season which begins in April. In the 2007 image, small-holder farms that have



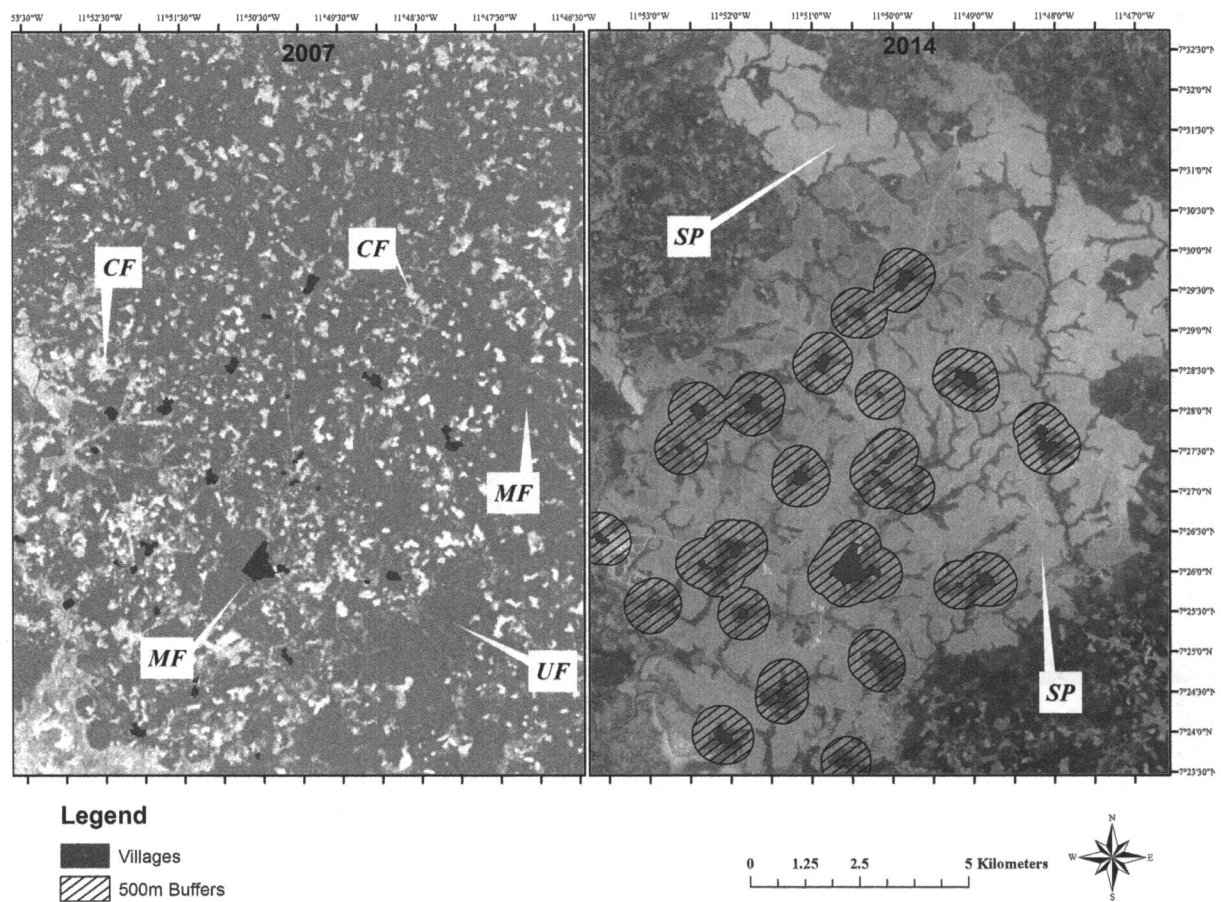
**Fig. 4** Classification of land uses in 2007 (before the onset of operations of the SOCFIN Agricultural Company) and in 2014 (when operations of the company are on-going)

undergone preparation in readiness for the rains is bare ground, seen as purple in the image and represented by CF, for cultivated farmland (Fig. 5). These are distinguished from dark green mature forest areas (men's and women's sacred forests), represented as MF. The light green areas are fallow farmlands and vegetated portions of swamps that have not been cultivated. In the 2014 image, areas that have been converted into oil palm monoculture (SP) are clearly distinguished from the surrounding area (Fig. 5).

The 500 m buffer is an arbitrary allocation of land that is not based on any study of local household and community land requirements. Interviews with relevant officials and stakeholders in the different sectors that are associated with, or deal with issues related to LSLA provide no evidence that this quantity is based on any assessments. Local communities emphasize

that they have no knowledge on how the 500 m buffer was decided, but are keen to point to the insufficiency of this land allocation to meet the most basic land needs for local residents. The 500 m rule is not respected in any of the communities studied (Table 1). In some communities such as Kortumahun and Potan, there is hardly any portion of land outside habitable areas that is available for these any socio-economic activity (Fig. 3). In focus groups, members of such communities point to two theories:

1. A strategy of the local land investment company (SOCFIN) to squeeze them out of their communities by depriving them of all access to land resources.
2. A plan by the company to turn them into "their slaves" by depriving them of all possibilities to make a living through any other means possible.



**Fig. 5** Landscape changes observed from 2007 to 2014. *CF* cultivated farmland, *UF* uncultivated farmland, *MF* mature forests, *SP* SOCFIN palm plantations

#### Cropland requirements to sustain household staple food needs

Provision in staple food is one of the key concerns for subsistence households in rural Sierra Leone. An estimation of land requirements to meet this important need can therefore be a good start to understanding the level of land needs for local communities. To estimate the amount of land required to meet the food needs of local populations, the area required to cultivate the annual staple food demand for an average rural household (HH) in Sierra Leone is calculated as such:

Average HH size

10 persons (WFP 2008)

Average daily consumption of polished rice per person (inclusive of the extra required for visitors)

0.4 kg per person

Average daily consumption per HH

$10 \text{ persons/HH} * 0.4 \text{ kg/person/day} = 4 \text{ kg/HH/day}$

Average annual consumption per HH

$4 \text{ kg/HH/day} * 365 \text{ days/year} = 1,460 \text{ kg/HH/year}$

Average yield of polished rice in Sierra Leone

352 kg/acre

Acreage required to produce 1460 kg/HH/year

$1460 \text{ kg/HH/year} / 352 \text{ kg/acre} = 4.15 \text{ acres/HH/year}$   
(app. 1.68 hectares/HH/year)

The area of 4.15 acres is required to meet the needs of an average household in staple food. However, the

**Table 1** Comparing the area of communities including existing buffers and the area if the 500 m buffer was implemented

Community	Community area + existing buffers (acres)	Area of 500 m buffer (acres)	Unmet area based on 500 m buffers	
			Area (acres)	Percent
Hongai	227	364	137	37
Hinai	141	357	216	60
Sembehun	62	906	664	73
Sinjo	78	(Overlap)		
Semabu	102			
Kortumahun	18	321	303	94
Kpombu	61	357	296	83
Masao	36	316	280	89
Basale	114	417	303	73
Banale	90	361	271	75
Kase	91	950	744	78.3
Potan	41	(Overlap)		
Bompetoke	74			
Kanga	24	244	220	90
Jombohun	92	650	361	56
Bobobu	54	(Overlap)		
Maka	65			
Bombohun	78			
Naiahun	117	456	339	74
Sahn-Malen	230	736	506	69
Jumbu	167	473	306	65
Bamba	86	347	261	75
Gambia	71	260	189	73
Kpangba	73	669	502	75
Gardorhun	94	(Overlap)		

The difference (unmet area) is represented in as amount of area as well as percent of area not yet brought into buffer based on the 500 m rule. When the 500 m rule is applied, some of the buffers overlap—communities for which these overlaps occur are indicated

provision of staple food per se does not solve the problems of food and nutrition security for households. Such food has to be prepared (hence the need for firewood); sources of protein have to be used to complement the staple rice meals (locals report chiefly depending on fishing from local waters for protein source); water has to be used, not only for cooking but for other domestic activities (hence the need for access to safe water sources). These reflections show that

while important, thinking about local land needs (even to meet local food security needs) goes beyond land for crop cultivation alone.

#### Future land requirements for agriculture in the Malen Chiefdom

The 500 m buffer (though not implemented by the Company) is a fixed allocation of land for a project that has the potential of lasting for more than one generation in the lifetime of Sierra Leoneans. It does not take into account changes in the demand and use of land that will occur in affected communities over the lifetime of LSLIs. Household and community land-uses and land needs are dynamic over time. The allocation of land for communities should therefore be flexible to accommodate this temporal dynamics. The Sierra Leonean population has a dynamic growth rate. According to the Sierra Leone Demographic and Health Survey 2008 report, the total fertility rate in Sierra Leone for the 3 years preceding the 2008 was 5.1 births per woman. Rural women however have an average of two more births (5.8) than women in urban areas (3.8). Table 2 shows the expected increase in population for some communities in the Malen Chiefdom based on system dynamics modelling. All communities show an increase in population that is supposed to slow down slightly from the middle of the century.

Agriculture is the largest economic sector in Sierra Leone. It employs about 65 % of the national labour force and contributes up to 45 % to the country's gross domestic product. Agriculture is especially vital in rural areas where food crop production (a land-dependent economic activity) employs over 95 % of the rural population, and where most households produce a good portion of their own food. Linking the current land situation with present and future agricultural land use needs is therefore important. In many communities (such as Kortumahun, Massao, Potan), there is almost no potential for the expansion of settlements as populations in these communities increase. With regards to agricultural land, these communities presently have a bare minimum of the required agricultural land to support local food security. While all sectors of land use show constraints to meeting land requirements at present, the baseline needs for farmlands per community in Table 3 illustrates the severity of the task of meeting food security

**Table 2** Population projections for some communities in the Malen Chiefdom up to 2060

Communities	2014	2020	2025	2030	2035	2040	2045	2050	2055	2060
Kortumahun	590	668	734	801	868	934	999	1,061	1,121	1,175
Sahn_Malen	4,790	5,426	5,966	6,510	7,052	7,590	8,113	8,619	9,103	9,548
Bassale	976	1,105	1,215	1,326	1,436	1,546	1,652	1,755	1,854	1,945
Hongai	619	701	770	841	911	980	1,048	1,113	1,176	1,233
Banalle	409	463	509	555	602	647	692	735	776	814
Jumbu	552	625	688	750	813	875	935	993	1,049	1,100
Semabu	586	664	730	797	863	929	993	1,055	1,115	1,169
Sinjo	418	473	520	568	615	662	708	752	794	833
Sembahun	102	116	127	139	150	162	173	184	194	204
Hinai	543	615	676	738	799	860	919	977	1,032	1,082
Gambia	149	169	186	203	220	236	253	268	284	297
Bamba	601	681	749	817	885	953	1,019	1,082	1,143	1,199
Kpombu	534	605	665	725	786	846	904	960	1,014	1,064
Kanga	68	77	84	92	100	107	115	122	129	135
Kpangba	303	343	377	412	446	480	513	545	576	604
Gandorhun	555	629	692	755	818	880	941	1,000	1,056	1,107
Potain	145	164	180	197	213	229	245	260	275	288
Massao	170	192	212	231	250	269	288	306	323	339

in these areas. Table 3 shows the minimum land requirements that individual communities require food crop production to meet current (baseline) and future staple food security needs.

The total population of the study area (communities in which SOCFIN is currently operating) is about 20,143 inhabitants. The population studied represents about 76 % of this total. The amount of land that needs to be set aside to ensure the current security in staple food for this 76 % of the population is 5,146 acres (about 2,082 ha, see Table 3). This represents about 32 % of the 6,500 ha of land that SOCFIN has currently acquired in the community. By 2060, given improvements in yield and levelling off of the population as revealed in the model, the communities will be coming close to balancing the requirements for land with the amount of land available. This is evidenced by a progressive decline in annual additions to the current land requirements to sustain security of staple food production (Table 3). By 2060, the amount of land required for the satisfaction of staple food requirements would have reached 8,612 acres (about 3,485 ha). This would represent about 54 % of the 6,500 ha of current land that has been acquired.

When we consider that these estimations are for the security of staple foods alone, the availability of land

for large-scale biofuel crop cultivation in communities such as these can be put in context. Agriculture in these rural communities has been for more than just subsistence living. Staple food production has always been carried out in association with the production of other crop-based economic assets—commonly termed “economic trees” or “tree crops”. In this region of the country such economic trees include trees such as oil palms, cocoa and kolanuts. Many households report having some land set aside specifically to harbour these economic trees.

## Discussion

Other land resources have been shown to be a hidden target for grabbing, behind the more publicized land grabs (Mehta et al. 2012; Rulli et al. 2013; Franco et al. 2013). Besides losing land-based resources as a result of them being grabbed for use by land investment interests, local communities also lose land-based resources that are not of direct use to the land investment companies. The large-scale conversion of land that once supported hunting, fishing, the provision of timber and non-timber forest products, sites of cultural activities deprive communities of these

**Table 3** Model-derived minimum agricultural land requirements for some communities in the Malen Chiefdom to meet ONLY current and future staple food needs up to 2060

Community	2014 baseline	Five-yearly minimum addition of land for food crop production									
		2020	2025	2030	2035	2040	2045	2050	2055	2060	
Kortumahun	253	27	23	22	20	20	18	16	14	11	
Sahn_Malen	2,058	221	182	177	168	160	146	129	115	88	
Bassale	411	44	36	36	33	32	29	26	23	18	
Hongai	260	28	23	23	21	20	19	16	15	11	
Banalle	172	19	15	15	14	13	12	11	10	7	
Jumbu	232	25	21	20	19	18	17	14	13	10	
Semabu	247	26	22	22	20	19	17	16	14	10	
Sinjo	176	19	15	16	14	14	12	11	10	7	
Sembehun	43	5	3	4	4	3	3	3	2	2	
Hinai	229	24	20	20	19	17	17	14	13	10	
Gambia	63	7	5	6	5	5	4	4	3	3	
Bamba	253	27	23	22	20	20	18	16	14	11	
Kpombu	225	24	20	19	18	18	16	14	13	9	
Kanga	29	3	2	3	2	2	2	2	2	1	
Kpangba	128	13	12	11	10	10	9	8	7	6	
Gandorhun	234	25	21	20	19	18	17	14	14	10	
Potain	61	6	6	5	5	5	4	4	3	3	
Massao	72	7	7	6	6	5	5	5	4	3	

Baseline represents the amount of land that is currently required, based on the population in 2014

environmental services. The idea of 500 m buffer zones around communities is an attempt to mitigate some of the losses of environmental services that are inevitably lost with LSLA. Upholding the 500 m rule (like other relations between land investing companies and local communities) requires legal and administrative backing. To safe-guard the position of local communities, robust, responsive, and accountable institutions are required to provide an enabling framework for the operation of large-scale land investments. This is important because major land investment interests tend to be financially powerful, capable of drawing political cloud, but pitted against local land owners and users who are generally unorganized and voiceless (Scoones et al. 2013; Franco et al. 2013). Besides a range of land resources that may be lost, become unavailable to local populations, or are appropriated for use by LSLI interests, water is one of the main resources that are co-grabbed during the process of LSLA. Co-grabbing of water as an integral part of LSLAs stem from the weak institutional and judicial framework within which LSLA occurs. According to Mehta et al. (2012) key features of such weak institutional and judicial frameworks include: “unequal power relations;

*fuzziness between legality and illegality and formal and informal rights; unclear administrative boundaries and jurisdictions, and fragmented negotiation processes”*.

500 m buffers do not answer all land use needs

The non-respect of buffer zones around communities (Table 1; Fig. 5) contravenes guidelines set by local LSLA interest groups (BEFS-WG 2013) and promises made by the SOCFIN Agricultural Company itself (Star Consult 2011). In the minimum criteria for biodiversity and conservation outlined in the Guidelines for Sustainable Agriculture and Bioenergy Investments in Sierra Leone (BEFS-WG 2013), it is stated that “*agricultural production cannot occur in key biodiversity areas and biological areas (defined as areas important for the conservation of regional biodiversity)*.” Relating to some of the areas that should be reserved when land investments take place, the document states that there should be no clearing of primary forests for agricultural production, and that the investment area must include buffer zones and corridors with surrounding ecosystems (BEFS-WG 2013). Buffer zones around communities (Fig. 5) and



corridors are therefore areas that should be reserved around communities for the express purpose of biodiversity and environmental conservation. This should therefore be in express recognition of other land use needs that still need to be addressed beyond biodiversity corridors.

The SOCFIN Agricultural Company outlines need for the existence of the 500 m buffers for the purpose of biodiversity conservation in its ESHIA. While the size of the buffer zones is not founded on any scientific analysis of the ecological ranges of local biodiversity or with discussion and the agreement of local communities that are supposed to be enclosed by these buffers, it is reasonable to expect that buffer zones around communities can be associated with biodiversity corridors. Corridors, to larger, undisturbed ecological sites should permit the faunal communities to sustain desired populations for their survival. It is observed however that these buffers rarely exist in any community. The question of their effectiveness as biodiversity corridors must however be raised if these buffers are not associated to biodiversity hotspots that would permit the survival of a majority of the prominent faunal species.

According to the Bioenergy and Food Security Working Group (BEFS-WG 2013), exemplary performance in biodiversity and environmental conservation by land investment companies would be attained if: (1) 20 % of total project area with native or adapted vegetation is restored or protected as buffer zones; (2) land equal to or greater than 60% of the company's agricultural production area is allocated to restore the natural ecosystem; (3) the company concerned purchases/pays for environmental services from/to farmers in the areas where they operate. Such recommendations (if adopted) have the potential of safe-guarding local land requirements for biodiversity conservation and the maintenance of environmental services in local communities. However, the demand for land in local communities goes beyond environmental requirements. It transcends into the social and cultural spheres of local community life as well as brings up issues of intergenerational equity. For local communities where LSLA has occurred to be deprived of access to land for these purposes point to failures in governance structures designed to uphold citizens' rights in countries that promote large-scale land investments.

### Institutional failures in mitigating and addressing shortcomings of LSLA

In Sierra Leone, three main governmental structures are directly responsible for some of the failures in land policy in rural Sierra Leone. These are the Sierra Leone Investment and Export Promotion Agency (SLIEPA); the Ministry of Lands, Country Planning & the Environment (MLCPE); and the Ministry of Agriculture, Food Security & Forestry (MAFFS).

#### *The Sierra Leone investment and export promotion agency (SLIEPA)*

In focus groups, local people were keen to stress that they have been abandoned by government, who is not there to protect their rights. SLIEPA is the government institution with the mandate to attract large-scale foreign investment to the country. Its key focus has been to provide and enhance opportunities for large-scale land investment companies in the country. It does this by informing investors on the rules, regulations and expectations of government policy regarding specific investments. SLIEPA therefore has a lot of influence that can contribute to meeting many of the shortcomings of LSLA currently being experienced in rural Sierra Leone. It can influence the choice of investments that come into the country in favour of those that uphold and promote land rights and food security of the local populace. It can contribute to the development of legal frameworks for investments that protect local access to land and related resources, food security (Table 3), decent wages and employment conditions.

While SLIEPA defends its activities as being designed to, among other things enhance food security, and create jobs for Sierra Leoneans, its mode of operation and activities have come under criticisms from diverse sources. There is a critical lack of information and public disclosure on the part of SLIEPA on all aspects of land deals in the country and a disturbing lack of transparency in the way the deals are negotiated. There is also a lack of clear operational guidelines regarding ministries and government bodies dealing with large-scale land investments. SLIEPA usurps the authority of some ministries when dealing in LSLA issues. SLIEPA advises LSL investors and help them introduce their ventures to the

government. In a further step to facilitate the LSLI process, SLIEPA is known to help the investors identify and engage local agents who will ease and expedite the land acquisition process.

*Ministry of agriculture, food security and forestry (MAFFS)*

MAFFS is a fundamental decision maker on national food security. It is a policy and process owner that determines institutional administrative policy and procedures on the production of food and all other aspects pertaining to food and nutrition security. It has as role therefore to provide an enabling framework for transformations in smallholder agriculture into sustainable, economically viable operations. Such a framework may ideally draw or be based on (among other things) projections of future population growth (such as presented in Table 2). It is also in charge of developing a sustainable, diversified, agricultural sector, which ensures food self-sufficiency, increase exports and creates jobs opportunities as well as improving land and water management through supporting sustainable productive increases which can restore the country's natural capital. To sustainably meet these objectives, MAFFS has to undertake activities aimed at increasing vegetation and tree cover, restoring soil fertility and reducing erosion, and restoring rainfed agriculture's resilience. With regards to the outcomes of LSLA on access to land and the protection of local food security and natural resources, MAFFS is arguably waning in its mandate. It is its role to estimate agricultural land use needs (such as in Table 3) for all communities affected or with the potential of being affected by LSLA and strive for such land to be available to communities. Its inability to protect the production potential of local communities affected by LSLA through safeguarding land for small-scale agriculture is therefore a let-down worth noting.

The goal of the Smallholder Commercialization Programme (the SCP), a flagship MAFFS project was to improve smallholder agriculture and increase food security at the national level (Melsbach and Rahall 2012). It however seems that the SCP has recently been transformed into promoting farming as a business—a drive towards increasing agricultural production through intensification and large-scale mechanization (ActionAid 2013). The SCP, born from

the concept that family farms are inefficient and unproductive (ActionAid 2013) can serve to explain why MAFFS' effectiveness in dealing with problems of land access and food security in communities affected by LSLA has been lukewarm at best. Part of the failures of MAFFS can be attributed to the laissez faire attitude of the investment climate relating to agricultural LSLAs in Sierra Leone. For example, MAFFS published a set of policy guidelines in 2009 for agricultural investments and incentives in the country. Many of the guidelines are nonbinding for investors. It is difficult to enforce objectives such as the attainment of food security within the framework of such non-binding agreements. In most cases, critical requirements, such as that investors go through MAFFS or that they establish a 5-year business plan to be submitted to a Government Negotiating Team, as specified in the MAFFS policy guidelines are ignored by SLIEPA when it introduces and creates an enabling framework for new LSLI companies to establish in the country.

*The ministry of lands, country planning & the environment (MLCPE)*

MLCPE is the ultimate decision maker on the planning, management and use of national lands. It is the policy and process owner that determines administrative policy and procedures regarding land issues in Sierra Leone. It is in charge of developing cadastral services, as well as informing the legal framework for land ownership that recognizes & formalizes local land rights. Part of its mandate also involves developing land-use planning; creating sustainable infrastructure for social improvement and economic growth. Its culpability in the failures of policies toward preventing, mitigating or addressing the negative outcomes of LSLA on local communities is very much akin to those of MAFFS. Together with related government sectors, the MLCPE can play a more proactive role in the negotiating processes of LSLA by providing cadastral services that inform the negotiation process. In Mozambique, German et al. (2011) note the importance of the role played by local cadastral services in land identification and delineation. In most cases of LSLA in sub-Saharan Africa however, the participation of cadastral services is fraught with problems and inconsistencies (German et al. 2011).

Failure to address issues of local rights to land access and food and nutrition security in the framework of operations for investing companies is a casualty of the poor governance framework in which LSLIs operates in Sierra Leone. While land investment companies are keen to exploit this weak governance context, the people of Sierra Leone are held hostage to it. The absence of any pre-defined penalties for non-adherence to terms of contracts limits the ability of individuals, communities, civil societies, and local authorities to enforce respect for key features of land engagement such as respect for land rights, protection of the environment, and protection of the basis of local livelihoods and food security.

#### Recommendations for policy makers

The existence of forests around or between communities does not necessarily mean that these forests can or should be cleared and converted into farmland or other economic uses. The ESHIA of some land investment companies in Sierra Leone (such as that of Addax Bioenergy) clearly noted that some of these forests: “*are either sacred and are not disturbed, or are actively utilised for livelihood purposes.*” In the same light, most of the forests or “unused land” in the buffer zones land around communities (considered as ecological corridors within the context of 500 m buffers), are lands from which local inhabitants may use as a base for livelihoods (for example, fuel wood harvesting). It seems serious thought has not been given on how local communities are expected to meet these needs when arbitrary buffers are decided on. The following recommendations can help address some of the key issues of land needs for local communities.

1. The promise of allocating buffers around communities should be respected by the SOCFIN Company, and the arbitrary size 500 m around communities revisited. It is important that the size of buffers be scientifically determined and reflect the social, economic and environmental realities of local communities. For example, should sacred forests (revered land uses of huge socio-cultural significance) be counted as buffers even when they cannot serve any other purpose than the socio-cultural role they have been conserved to play over several generations?
2. Before the determination of land availability for large-scale land investments, land should ideally be set aside for all local needs that are inflexible such as (land for habitation, traditional forests for men’s and women’s societies, land with access to vital life-support resources such as water sources, firewood provision, fishing and food crop land for local communities).
3. Where large-scale land acquisition has already occurred, it is recommended that households and communities be provided with a minimum of land to meet the inflexible needs identified in (2) above. As a matter of urgency, immediate steps that allocate land to meet current food and nutrition security of affected communities may be desirable.
4. The state stands to benefit immensely by developing a legal framework for upholding the tenets of land sovereignty for local communities. Besides enforcing that land investing companies adhere to respecting local land rights, such structures should ideally include full representation of local parties in land related disputes with land investing companies.
5. Given the demographic changes that are forecast to occur in Sierra Leone, the process of assessing the land needs of communities should not be static. It should be a dynamic process that is implemented in the land lease agreements between the government, local communities and land investing companies. Based on sound scientific analysis, the amount of land to be relinquished to communities affected by land acquisitions should be calculated and transparently reported to all parties. The time for such land to be relinquished (every 2 or 5 years) should be clear to all.

#### Conclusion

We set out to investigate the extent to which local communities where LSLA has occurred could access land and land related resources. We also wanted to know how much land would be required to meet local food needs in these communities both at present and throughout the duration of the first phase of land lease agreements with the land investing company. We

found that local communities had six main land uses that needed to be recognized and protected. We also found a systematic non-adherence to the 500 m buffer zones around communities promised by SOCFIN Company. While this arbitrary buffer is not based on any investigation of local land needs per household in the community or per population in that community, it is rarely respected by the investing companies. Communities in which LSLA has occurred would need some land set aside to meet their current and future food needs. The size of this land would have to be incrementally augmented to meet the demand for food crop land by a growing rural population. While the implementation of measures to make available such land for food crops production is urgent, it does not address land requirements for other non-food uses. Regulation that addresses the current situation of land deficit in cases where LSLA has already occurred should also be applied to prevent the repetition of the same practices in any future cases of large-scale land investments.

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## Appendix

See Table 4.

**Table 4** Population data used for modeling

Community	Population
Sahn-Malen (for 2013)	4,582
Kortumahun (for 2013)	564
Bassaleh	850
Hongai	593
Bannaleh	356
Jumbu	481
Semabu	511
Sinjo	364
Sembehun	89
Hinai	473
Gambia	130
Bamba	524

**Table 4** continued

Community	Population
Kpombu	465
Kanga	59
Kpangba	264
Gandorhun	484
Potain	126
Massao	148

All of the population is for 2009, with the exception of Kortumahun and Sahn-Malen that is from 2013

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