J Agric Environ Ethics (2013) 26:1105–1126
DOI 10.1007/s10806-013-9448-9

ARTICLES

Large-Scale Land Acquisition: Evaluating its Environmental Aspects Against the Background of Strong Sustainability

Lieske Voget-Kleschin

Accepted: 15 February 2013 / Published online: 6 March 2013
© Springer Science+Business Media Dordrecht 2013

Abstract Large-scale land acquisition (LaSLA) in developing countries is discussed controversially in both the media as well as academia: Opponents point to negative social and environmental consequences. By contrast, proponents conceive of LaSLA as much needed investment into the formerly neglected agricultural sector. This contribution aims at analyzing LaSLA's environmental dimension against the background of strong sustainability. To this end, I will first introduce sustainable development as a normative concept based on claims for intra- and intergenerational justice. Subsequently, I will argue in favor of a conception of strong sustainability and employ this conception in developing guidelines for the sustainable handling of natural capital. By outlining the main drivers and consequences of LaSLA, the contribution hopes to demonstrate that proponents conceive of LaSLA as a potential solution to several sustainability problems, notably answering growing worldwide demand for agricultural commodities by increasing agricultural yields, substituting agrofuels for fossil fuels and providing acreage for offsetting carbon emissions. Against this background I argue that if LaSLA causes environmental externalities, it actually increases the problems it is supposed to resolve. Thereby, I develop sustainability criteria in regard to LaSLA's environmental consequences.

Keywords Large-scale land acquisition · Sustainability · Agrofuels · Carbon offsetting · Consistency · Resilience

Introduction

Large-scale land acquisition (LaSLA) in developing countries by both public and private investors has lately received considerable conflicting media attention: While

L. Voget-Kleschin (✉)
Department of Philosophy, Kiel University, Leibnizstr. 4, 24118 Kiel, Germany
e-mail: voget-kleschin@philsem.uni-kiel.de

critique mainly focuses on LaSLA's social consequences, opponents also fear negative environmental impacts. In contrast, proponents conceive of LaSLA as much needed investment into the formerly neglected agricultural sector, with potential to attract capital and yield infrastructure investment, technology transfer and job creation. Furthermore, proponents conceive of LaSLA as a potential solution to several sustainability problems, notably answering growing worldwide demand for agricultural commodities by increasing agricultural yields in developing countries, substituting biofuels for fossil fuels and providing acreage for offsetting carbon emissions.

This contribution aims to analyze LaSLA's environmental dimension against the background of strong sustainability. To this end, I first introduce SD as a normative concept based on claims for intra- and intergenerational justice. Subsequently, I will argue in favor of a conception of strong sustainability and employ this conception in developing guidelines for the sustainable handling of natural capital.

These guidelines serve as a framework for analyzing LaSLA as a way of dealing with natural capital. In this regard, I will discuss key drivers of LaSLA, arguments brought forward in favor of LaSLA as well as concerns about LaSLA's environmental consequences. This analysis constitutes the foundation for the subsequent critical discussion of arguments put forward by both proponents and opponents of LaSLA. The discussion aims at developing sustainability criteria in regard to LaSLA's environmental aspects. The final section concludes.

Before proceeding with the analysis of LaSLA's drivers, I would like to add an additional remark regarding the definition of LaSLA: The core of the phenomenon described by this term is fairly clear. It consists of land acquisitions by foreign investors aiming at producing agricultural commodities. However, a closer look at the literature reveals that the boundaries of the phenomenon are much less clear. Thus, some authors hold LaSLA to cover land acquisitions for/by extractive industries, for tourism and because of growing urbanization (Merlet and Jamart 2009; Zoomers 2010). Others include speculative investment (Deininger and Byerlee 2011). Yet others point out that a significant part of large-scale agricultural investment in land in developing countries stems from domestic sources (Cotula et al. 2009; Borras and Franco 2010; Deininger and Byerlee 2011). Because the following contribution aims at an analysis of LaSLA's environmental aspects, I will focus on LaSLA's aiming at food and biofuel production as well as carbon offsetting. Thus I will forego land-acquisitions for extractive industries, tourism and urbanization. Furthermore, I will not distinguish between foreign and domestic investors.

A normative Concept of Sustainable Development

Sustainable development (SD) constitutes a leading model for contemporary societal development. Despite or probably because of this, the complex idea of SD has often been used as a catch-phrase without specific meaning. Accordingly, different parties interpret the concept according to their particular interests.

However, in so far as this is the case, the concept is no longer suited for orienting societal development.

One way of dealing with this issue consists in taking a meta-perspective, that is, listing those questions to which any conception of SD needs to be able to answer, irrespective of what the answer actually were (cf. Christen and Schmidt 2011, Burger and Christen 2011; Norton 2005; Dobson 2003). This allows distinguishing between a general scheme or concept of SD on the one hand and different, specific conceptions of this concept on the other.[1]

A Framework for Conceptions of Sustainability

As a starting point for conceptualizing SD, I will draw on the seminal Brundtland-definition that conceives of SD as development "that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987: 43). Christen and Schmidt (2011) conceive of this definition as a "developmental dilemma": the aim to achieve a decent quality of life for contemporary humans potentially threatens the possibilities to achieve a decent quality of life for future humans. That is, claims for SD presuppose moderate scarcity in the assets that are necessary to achieve justice (Christen and Schmidt 2011; Muraca and Voget-Kleschin 2011). I propose that one way to acknowledge this dilemmatic structure is to understand SD as necessarily encompassing two kind of claims[2]:

- *Direct claims* for justice demand that all contemporary and future human beings should be able to live a decent human life. Specifying direct claims for justice entails the identification of those beings that qualify as legitimate recipients of benefits and burdens (scope of justice), specifying the pattern according to which benefits and burdens should be distributed (pattern of justice) and specifying the criterion according to which the pattern of justice should be evaluated (metric or currency of justice) (Page 2007a, b, for an example of such a specification and its utilization in regard to LaSLA cf. Voget-Kleschin and Stephan in this issue).

[1] For the distinction between concept and conception, cf. Rawls (2005), with regard to sustainable development Burger and Christen (2011).

[2] It is important to note that the distinction between direct and indirect claims for justice does not map onto the distinction between claims for intra- and intergenerational justice respectively. On the one hand, since direct claims for justice are about directly harming or benefiting other people, they apply to the intragenerational realm only. On the other hand, indirect claims for justice can in principle apply to both the intra- and intergenerational realm. Thus in regard to natural capital it is obvious that deterioration of natural capital can result in harmful consequences for both contemporary as well as future human beings. However, I find it difficult to distinguish between direct claims for justice and indirect claims for intragenerational justice in regard to social capital. This is so because such a distinction necessitates distinguishing if an act directly harms the individual or can be interpreted as resulting in deterioration of social capital. I here employ a broad understanding of social capital, encompassing what can be differentiated as human capital, knowledge capital and social capital in a narrow sense, e.g., social cohesion, trust etc. Social capital broadly conceived thus results from and is reproduced by contemporary individuals. I therefore find it difficult to imagine a process/action that results in deterioration of social capital which harms contemporary human beings and does not concurrently also qualify as violation of direct claims for justice. Accordingly, I tentatively suggest that indirect claims for the maintenance of social capital do probably only apply to the intergenerational realm.

- *Indirect claims for justice* encompass claims for a handling of social, real and natural capital that qualifies as not undermining contemporary and future humans' ability to live a decent human life. Specifying indirect claims for justice necessitates delineating social, real and natural capital and specifying what qualifies as sustainable and unsustainable handling of these assets respectively.

It is important to note that the Brundtland-definition implies these two kinds of claims to be equally important and mutually constraining each other. This means that a certain process or measure, such as LaSLA does only qualify as contributing to SD if it

- contributes to meeting either direct or indirect claims for justice or both, and
- does neither violate direct nor indirect claims for justice.

Accordingly, an encompassing sustainability analysis of a phenomenon such as LaSLA needs to investigate LaSLA's implications regarding direct and indirect claims for justice. However, because direct and indirect claims for justice are equally important and mutually constraining each other, reasoning that LaSLA does not contribute to SD merely necessitates demonstrating that it either violates direct or indirect claims for justice. Hence, this contribution analyses if and in how far LaSLA complies with indirect claims for justice regarding natural capital.

Strong Sustainability as a Partial Conception of Sustainable Development

Natural capital encompasses those aspects of nature that are in any way relevant in regard to claims contemporary and future humans can make in the name of justice. However, this does not mean that the term describes a homogenous, tangible part of nature. In contrast, natural capital can be described as "a plurality of interlinked and interdependent, heterogeneous funds yielding different functions and services" (Ott and Döring 2008: 182–183, translation: LVK).[3] Furthermore, natural capital is characterized by being alive/animate and intrinsically (re)productive (Biesecker and Hofmeister 2010).[4] I thus propose that natural capital exhibits an internal multifunctionality. With this I mean that the different parts of natural capital exhibit multiple functions both in regard to maintenance of other parts of natural capital (e.g., a tree constituting a habitat for insects, birds and small mammals) as well as in regard to the services natural capital yields for human beings (e.g., a tree as yielding wood for heating or building and a forest as constituting a recreational area and as exhibiting a balancing effect on the local microclimate). Because of this

[3] "eine Pluralität miteinander vernetzter, heterogener Bestände […], die unterschiedliche Funktionen und Leistungen erbringen" (ibid.).

[4] This does not imply that all parts of natural capital are alive/animated and intrinsically reproductive. By way of example, water is not alive and does not as such reproduce itself. Nevertheless, in so far as water-bodies constitute (parts of) ecosystems, the living beings that are also part of these ecosystems allow for regeneration of water quality. Furthermore, in so far as water is part of the global water cycle, water bodies such as rivers, lakes and groundwater are continuously reproduced. Thus, because all different parts of nature are integrated in both biological as well as geo-chemical cycles, the totality of natural capital can be characterized as alive/animate and intrinsically reproductive even if not all of its parts exhibit these characteristics.

multifunctionality, substituting a part of natural capital necessitates substituting all functionings that this part of natural capital exhibits in regard to both other parts of natural capital as well as in regard to human use of natural capital (Muraca 2009). I propose that combining this insight with the precautionary principle constitutes a persuasive case for a (prima facie) obligation to sustain natural capital (Ott and Döring 2008).[5] The claim that natural capital cannot be substituted for by other forms of capital and should thus be maintained designates the position of strong sustainability (Baumgärtner and Quaas 2009; Neumayer 2010).

Accordingly, from the perspective of strong sustainability, if LaSLA violates the claim for maintaining natural capital, it qualifies as unsustainable no matter if and how it affects other forms of capital. This is not to say that in real life decisions one might not advocate a project arguing that increase in other forms of capital balances lack of natural capital. Actually, improvement in other forms of capital (e.g., creation of jobs, infrastructure investments, cf. Deininger and Byerlee 2011) are often used as an argument in favor of LaSLA. However, according to strong sustainability as laid out here, because it results in loss of natural capital and because loss of natural capital cannot be substituted for by increase in other forms of capital, such a project would not qualify as contributing to SD.[6]

Nevertheless, as such, that is, without any further specification, strong sustainability constitutes no more than a partial conception of SD. This is so, because I have neither delineated real and social capital nor specified direct claims for justice. However, as the subsequent discussion will demonstrate, such a partial conception suffices for the aim of this paper, namely evaluating environmental aspects of LaSLA.

Strong Sustainability Guidelines for Handling Natural Capital

Drawing inter alia on Daly (1991) and Biesecker and Hofmeister (2010), I propose to conceptualize natural capital as both the starting point and the outcome of the production process, embracing anthropogenic production and consumption. Thus, the extent to which human beings do use natural capital depends on the dimensions of anthropogenic production and consumption, with anthropogenic production being instrumentally geared towards consumption. Assuming the current extent of human utilization of natural capital to be unsustainable and in need of reduction allows deriving the following guidelines of strong sustainability:

[5] For more encompassing reasonings in favor of strong sustainability cf. amongst others Ott and Döring (2008), Constanza and Daly (1992), Daly (1996), for a seminal overview regarding strong versus weak sustainability cf. Neumayer (2010).

[6] Furthermore, field studies show that actual investments regularly fail to result in such improvements of other forms of capital (cf. Deininger and Byerlee 2011; Oakland Institute 2011, for examples of cases cf. also the jatropha biofuel project discussed by Purdon in this issue, the Norwegian ScanFuel/ScanFarm in southern Ghana discussed by Wisborg in this issue, and Limphasa Sugar Corporation in Malawi, discussed by Blessings et al. in this issue). Moreover, field studies also show that actual investments regularly feature violations of direct claims for justice (e.g., loss of livelihood and negative impacts on food security, cf. section "LaSLA as Handling Natural Capital: Drivers and Environmental Consequences in a Framework of Sustainability").

- *Decreasing demand* by countering population growth and reducing consumption per capita (sufficiency): The extent to which consumption uses natural capital is proportionally correlated to the product of population multiplied by consumption per capita. Thus limiting the extent to which human beings use natural capital can be achieved by limiting either or both of these factors.
- *Efficiency*: The extent to which consumption draws on natural capital can also be influenced by enhancing the rate with which anthropogenic production transforms natural capital into goods. Accordingly, a further guideline for strong sustainability consists in aiming at efficiency in regard to anthropogenic production. Efficiency encompasses either maintaining consumption per capita while reducing the extent to which humans use natural capital or increasing consumption per capita while maintaining the extent to which humans use natural capital.
- *Consistency*: As mentioned, natural capital does not only constitute the starting point but also as the outcome of the production process. Thus, human production and consumption create feedbacks onto natural capital. Such feedbacks can take a positive and negative stance respectively. Consequently, a further guideline of sustainability asks to reduce negative feedbacks of anthropogenic production and consumption on natural capital. That is, it basically claims that projects and processes such as agriculture but also industry and mobility respectively need to avoid negative environmental effects. In other words, this guideline asks that human production and consumption is *consistent* with natural processes. I will therefore denominate this guideline as consistency. By way of example, in relation to agriculture, the guideline of consistency encompasses claims such as avoidance of soil erosion or avoidance of pollution of adjacent water bodies.
- *Resilience* In cases where anthropogenic production and consumption have already led to a depletion of natural capital, resilience asks for human action that enhances the quality of natural capital (Ott and Döring 2008; Schultz et al. 2008).[7] By way of example, production methods as cover crops or catch crops may enhance the soils' capacity for water retention and thus allow for increasing productivity, especially in the dry season (Pretty 2008).

Finally, in this contribution I will presuppose that certain environmental effects, namely emission of greenhouse gases (GHGs), negative effects regarding biodiversity, vegetation cover and soil degradation, increase in extreme local weather events and increase in flash floods indicate mishandling of natural capital. While in regard to negative effects on biodiversity the argument refers to potential value of biodiversity for future generations, negative effects of climate change on humanity are already apparent. Thus, anthropogenic GHG-emissions affect natural capital in ways detrimental not only to future but also to contemporary humans (Gardiner 2004; Caney 2010). This is even more obvious in regard to soil degradation, increase in extreme local weather events, and increase in flashfloods that all significantly undermine agricultural productivity.

[7] In this context, I use the term resilience solely as a heading for a guideline for strong sustainability. However, in the scientific literature the term is usually used with a much broader meaning (cf. Brand and Jax 2007).

Against this background, the subsequent section discusses LaSLA's environmental consequences.[8] It is important to note first, that in so far as this discussion focuses on environmental aspects to the exclusion of social effects, it does not constitute an encompassing sustainability analysis. Nevertheless, as discussed, demonstrating that certain consequences violate indirect claims for sustainable handling of natural capital (understood in terms of strong sustainability) suffices for evaluating LaSLA as unsustainable. Conversely, compliance with strong sustainability guidelines for handling of natural capital constitutes a necessary though not sufficient criterion for LaSLA to qualify as contributing to SD.

Second, addressing environmental consequences of LaSLA from the perspective of strong sustainability does not necessarily cover all aspects that might be of relevance from an environmental ethics perspective. This is so because sustainability does not ask for the preservation of nature as such but rather for the preservation of natural capital.

LaSLA as Handling Natural Capital: Drivers and Environmental Consequences in a Framework of Sustainability

As discussed, LaSLA can be conceived of as a way of handling natural capital and can thus be evaluated from the perspective of guidelines for strong sustainability as outlined above. This relates first to potential negative consequences of LaSLA. Opponents' critique of LaSLA primarily focuses on the social consequences, encompassing lack of inclusion of local population in decision making about land deals, loss of land based livelihoods, negative impacts on food security, insufficient creation of employment and the exacerbation of existing conflicts over land-based resources (cf. Kugelman 2009; Meinzen-Dick 2009; Merlet and Jamart 2009; Vermeulen and Cotula 2010; Wily 2011; Hall 2011, cf. also Voget-Kleschin and Stephan in this issue). However, opponents also apprehend negative environmental effects due to a change in production methods from small-scale to large-scale industrialized agriculture and negative environmental consequences of the conversion of (allegedly) unused forested and non-forested land towards agriculture (see below). These negative environmental effects may point to the conclusion that LaSLA constitutes a case of mishandling natural capital that violates indirect claims for justice.

Second, an analysis of LaSLA's key drivers yields that arguments brought forward in favor of LaSLA can also be linked to these same guidelines of strong sustainability. That is, the analysis will show that proponents of LaSLA—at least implicitly—draw on ideas of SD when arguing that LaSLA can contribute to alleviating problems such as food shortages and climate change.

Maintaining that both arguments contra as well as in favor of LaSLA can be traced back to guidelines for strong sustainability seems surprising if not paradoxic. In the following I will therefore elucidate these claims.

[8] I will first focus on those strong sustainability guidelines directly linked to humanities handling of natural capital, that is efficiency, consistency and resilience, before coming back to reducing demand in section "LaSLA and Efficiency."

Key Drivers of Large-Scale Land Acquisition[9]

Both the food crisis and the financial crisis are often cited as main drivers for the rise in LaSLA (Grain 2008; Graham et al. 2010; Deininger and Byerlee 2011). Thus, export restrictions imposed by major food producers in times of high food prices are said to have provoked countries with land and water constraints but rich in capital to secure food supplies via investment in land in development countries (von Braun and Meinzen-Dick 2009a). However, motives for government involvement in land deals[10] are not confined to food security. Rather, they also encompass considerations for the availability of agricultural commodities in general. Accordingly, the German Federal Ministry for Economic Cooperation and Development distinguishes three groups of public investors: (BMZ 2009)

- East Asian countries with high population pressure which are experiencing rapidly growing demand for food and other agricultural materials,
- food importing countries from the Arab region with limited land and water resources but plenty of capital, trying to reduce their dependence on world market price trends, and
- industrialized countries looking for land on which to grow agricultural raw materials for biofuel production.

The direct motive for private investment consists in expectations of returns, based on anticipation of a long-term rise in agricultural commodity prices (Cotula et al. 2009). Alongside productive investment, private engagement in LaSLA encompasses speculative investment. Speculative investment is interpreted as a reaction to the collapse in equity and bond markets resulting from the global financial crisis. This led to a rising appeal of land and commodities as investment objects (Cotula and Vermeulen 2009; Deininger and Byerlee 2011). Accordingly, investors perceive of (agricultural) commodities as a hedge against inflation as well as a possibility for portfolio diversification (Blumenthal 2009; Deininger and Byerlee 2011).

[9] My analysis of drivers of LaSLA excludes more tacit or underlying motives such as power, corruption and policy. This is not to say that I do not hold these to constitute important motives. Rather, I hold, that in so far as these issues are always linked to specific contexts, their adequate discussion would need to emanate from an examination of case studies. Such a discussion would exceed the scope of this paper. (but see e.g., Neef et al.; Blessings et al. in this issue) Accordingly, I acknowledge that in not covering these issues my analysis is incomplete. However, I hold that this does not invalidate my argument in favor of sustainability criteria for LaSLA. Rather, issues such as power, corruption and policy constitute an obstacle regarding the implementation of such criteria. For a discussion of how this bears on the potentials of codes of conducts to remedy LaSLAs negative impacts cf. Voget-Kleschin and Stephan in this issue. For a discussion of how human rights approaches can re-shape power relations and practice cf. Wisborg in this issue.

[10] Government involvement in land deals encompasses direct land acquisition by central governmental agencies, investments by sovereign wealth funds (SWFs), investment through state-owned enterprises and other non-SWF equity shares as well as support to private sector in investor and host countries, e.g., via development funds (Cotula et al. 2009). Furthermore, even purely private investment projects are influenced by governmental action in that governments establish the regulatory framework under which an investment takes place, notably through bilateral investment treaties (BITs) (ibid.).

Hence, I propose that there exists an underlying expectation that led both public and private investors to conceive of LaSLA as an adequate reaction to the food and financial crisis respectively and that thus unites public and private investors. This is the expectation of demand for agricultural commodities outrunning supply, resulting in either physical scarcity or at least rising prices of these commodities. I thus hold that the food and financial crises constitute causes but not reasons for the rise in LaSLA.

In regard to supply, Bruinsma (2009) argues that in regions where the potential of existing technology is being fully exploited, scope for raising yields is much more limited than in the past. Furthermore, negative effects of climate change (Easterling et al. 2007) and environmental externalities of existing agricultural systems, such as soil compaction and erosion (Batey 2009; Hamza and Anderson 2005; Dent et al. 2007) are expected to negatively influence agricultural productivity (cf. also Fig. 1).

Concerns regarding rising demand are based on expectations of population growth, dietary changes, notably of middle classes in transition countries, and increasing urbanization (Cotula et al. 2009; Deininger and Byerlee 2011; UNCTAD, UNEP 2008; cf. Fig. 1).

Finally, a further important factor that is affecting demand stems from political drivers, namely biofuel policies and emerging carbon markets regarding land use, land use change and forestry (LULUCF) (cf. Fig. 1). First, a significant part of investors does not aim at producing food but biofuel feedstuff (Cotula et al. 2009; Deininger and Byerlee 2011). Thus, Anseeuw et al. (2012) state that of the project

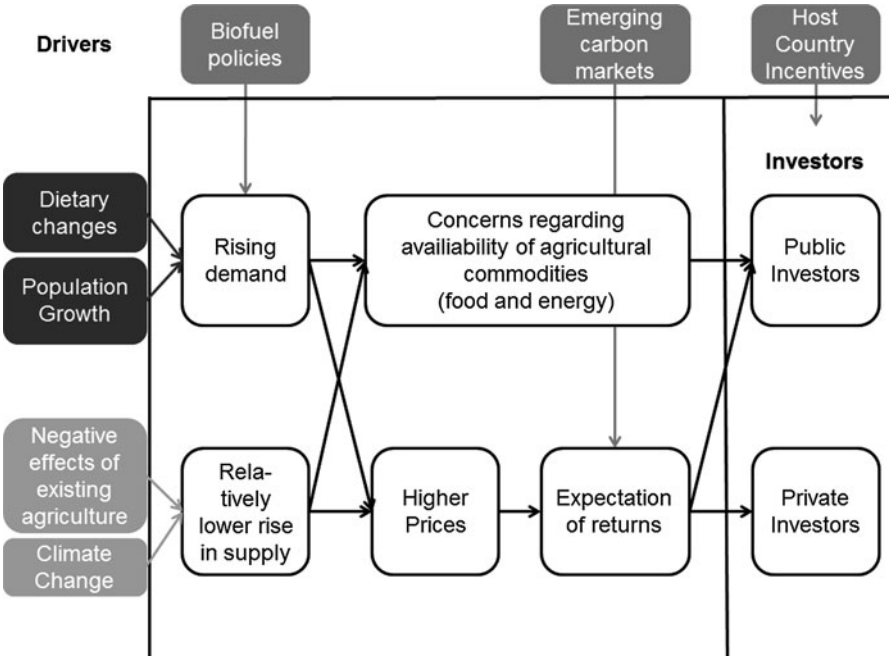

Fig. 1 Key drivers of LaSLA

area covered by the land matrix database[11] 26 % is covered by food crops, 26 % by flex crops,[12] and 17 % by non-food crops.[13] Some authors even hold that the majority of land acquired in land deals is scheduled for biofuel production (cf. Hall 2011 in reference to Southern Africa). Increases in demand for biofuels in the EU, US and most other biofuel-producing countries have mainly been driven by subsidies and mandates.[14] Second, the extent to which emerging carbon markets are conceived as (political) drivers of LaSLA is mixed (Technical committee on 'land tenure and development' 2010; Zoomers 2010). So far only a minority of land deals documented in the literature aim at carbon offset revenues (cf. Deininger and Byerlee 2011; Anseeuw et al. 2012). However, it is acknowledged that potential returns from carbon markets may contribute to increasing land values (Cotula et al. 2009).

Arguments in Favor of Large-Scale Land-Acquisition

This analysis of LaSLAs drivers shows that while environmental problems do not constitute the only driver of LaSLA, the phenomenon can partially be conceived of as a reaction to environmental problems arising from unsustainable handling of natural capital. That is, arguments brought forward in favour of LaSLA can be related to strong sustainability guidelines as outlined above:

- LaSLA targeting the production of agricultural commodities, i.e. food and biofuel feedstocks: As discussed, LaSLA is motivated by expectations of demand for agricultural commodities outrunning supply. In regard to worries about supplies, investors as well as proponents of LaSLA point to the low efficiency of the agricultural sector in many of LaSLA's target countries. They argue that LaSLA allows increasing productivity and thus closing the so called yield gap, thereby contributing to an increase in global agricultural commodity production (Blumenthal 2009; Meinzen-Dick 2009; Deininger and Byerlee 2011). From this perspective, LaSLA is conceived of as allowing the production of *more* commodities on the *same* amount of land (as part of natural capital).

[11] The landmatrix database is an online public database of largescale land deals facilitated by a partnership between The International Land Coalition (ILC), The Centre for Development and Environment (CDE), La recherche agronomique pour le dévelopment (CIRAD), The German Institute of Global and Area Studies (GIGA) and The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). To my knowledge it is the most extensive and reliable database on LaSLA currently available.

[12] The concept of flex-crops describes crops that have multiple uses between which it is easy to switch. Thus soya can be used for feed, food and biofuel, sugarcane can be used as food or ethanol, palm oil can be used as food, biodiesel or for industrial purposes and corn for food, feed an ethanol (Borras et al. 2012).

[13] The remaining 31 % encompass land deals where production is not confined to a single crop and can therefore not be categorized in the same way.

[14] The EU began to rapidly expand biodiesel production after the EU directive on biofuels (2003/03/EC) entered into effect in October 2001, stipulating that national measures must be taken by EU countries, aimed at replacing a certain percent of all transport fossil fuels with biofuels. The US expanded its biodiesel production following legislation passed in 2004 which took effect in January 2005, providing an excise tax credit of biodiesel made from agricultural products (Mitchell 2008). For overviews over current targets, mandates, and support measures, cf. Fischer (2009), International Energy Agency (2010).

This links (arguments in favor of) LaSLA to the sustainability guideline of *efficiency*.

- LaSLA targeting the production of biofuel feedstocks: While biofuel policies are associated with aims for energy security, rural development, and—in the case of countries with favorable endowments of land, labour and trade conditions—export development, their (at least allegedly) primary goal is mitigation of climate change (Dufey et al. 2007; Clancy 2008; Fischer 2011). This is based on the assumption that biofuels are carbon neutral. That is, it is argued that the amount of carbon dioxide released by combustion of biofuels is balanced by the amount of carbon that feedstock sequestered while growing. At the same time, emissions of GHGs cause climate change. From a sustainability perspective, climate change constitutes a negative feedback of anthropogenic production and consumption on natural capital. Therefore, insofar as LaSLA allows for the production of biofuels and in so far as biofuels are conceived of as contributing to the mitigation of climate change, LaSLA can be conceived of as allowing for reducing negative feedbacks of anthropogenic production and consumption on natural capital. This links (arguments in favor of) LaSLA to the sustainability guideline of *consistency*.
- LaSLA targeting carbon offsetting: Carbon offsetting describes a process in which one party wishing to reduce GHG-emissions but not willing or able to change a certain behavior that results in GHG-emissions pays a second party to reduce emissions elsewhere so as to compensate for these emissions. Carbon offsetting is possible because climate change is a non-localized problem, that is, for climate change to occur it doesn't matter where GHG are emitted. Accordingly, for mitigation of climate change it doesn't matter where GHG-emissions are reduced (Kollmuss, Zink and Polycarp 2008). Among others, carbon offset possibilities include projects that aim at reducing GHG emissions from land use practices, so called Land Use, Land Use Change and Forestry (LULUCF) activities. These include (1) avoidance of deforestation and thus of the loss of stored carbon (Reduced Deforestation and Degradation (REDD)), (2) increasing carbon storage by sequestration (afforestation and reforestation) and (3) increasing carbon storage by soil management techniques (e.g., no-till agriculture) (ibid.). Thus carbon offsetting describes human behavior that aims at enhancing carbon sequestration that humans consider a natural service. Therefore, carbon offsetting can be conceived of as investment in natural capital. This links (arguments in favor of) LaSLA to the sustainability guideline of *resilience*.

Critique of LaSLA's (Potential) Negative Environmental Consequences

Critique of LaSLA mainly focuses on LaSLA's consequences for the local population in host countries. References to potential environmental consequences are few and usually quite general. Thus in the following I sketch a conceptual approach. As discussed in the introduction, this paper focuses on LaSLA that aim at food and biofuel production as well as carbon offsetting, to the exclusion of other

purposes such as extractive industries, tourism and urbanization. Accordingly, I propose to distinguish the following processes as separable aspects of LaSLAs that can be separately analyzed regarding their respective potential environmental consequences:

1. Changes of production methods towards large-scale, mechanized, less labor-intensive, more energy-intensive production
2. Conversion of land-use systems, including
   i. Conversion of forests towards agriculture
   ii. Conversion of allegedly unused, non-forested land towards agriculture[15]
   iii. Conversion of agricultural land and allegedly idle non-forested land towards carbon capture, especially forests.

From an environmental perspective, opponents associate a change of production methods from small-scale subsistence agriculture towards large-scale, mechanized, less labor-intensive, more energy-intensive production with negative impacts. In regard to LaSLA that causes conversion of forested and non-forested but allegedly unused land towards agriculture, Meinzen-Dick (2009) point to threats for biodiversity, loss of carbon stocks and soil degradation. In a similar vein, Spieldoch and Murphy (2009) associate LaSLA with excessive use of fresh water, depletion of soil nutrients and a heavy dependence on fossil fuels for machinery, fertilizer, pesticides, storage, and transportation. Likewise, Montemayor (2009) points to degradation and water pollution.[16] Arguments such as these object to the perspective put forward by proponents of LaSLA, who regard LaSLA as a possibility that allows producing more commodities while drawing on the same amount of natural capital. Instead, opponents argue that even though LaSLA may indeed allow producing more agricultural commodities on the same amount of land, this is only possible while concurrently drawing on higher amounts of (non-renewable) inputs and effecting negative consequences on other aspects of natural capital such as biodiversity, soil fertility, water purity and the global climate. Thus, in contrast to proponents of LaSLA who conceive of it as an increase in (agricultural) efficiency, opponents argue that LaSLA runs counter to both *efficiency* and *consistency*.

Environmental consequences of conversion of forests into agricultural land are usually significantly negative, being associated with loss of carbon stored in biomass and soil (Guo and Gifford 2002; Murty et al. 2002) and biodiversity loss (de Chazal and Rounsevell 2009). Conversion of allegedly unused non-forested land to agricultural land may be associated with similar consequences. Accordingly, opponents argue that conversion of forests and allegedly unused non-forested land can be conceived of as losses of natural capital. Therefore, they interpret these processes as running contrary to the claim for human action that enhances natural

[15] In the following I will subsume conversion of forested and non-forested, allegedly unused land towards agriculture under the notion of land-use change. I thus employ the term land-use change in an understanding similar to that involved in the term "Land-use, land-use change and forestry."

[16] In this section I discuss the arguments brought forward by opponents of LaSLA and thus cite the respective literature. The question if and in how far these arguments are backed by empirical insights is discussed in the subsequent section. Accordingly, the relevant empirical literature is given in that section.

capital. Accordingly, they conceive of such land-use change as transgressing the strong sustainability guideline of *resilience*.

Interpreting LaSLAS in a Sustainability Framework

The above analysis of LaSLA's drivers as well as concerns regarding LaSLA's environmental consequences demonstrated that arguments of both proponents as well as opponents of LaSLA can be linked to strong sustainability guidelines: Proponents conceive of LaSLA as a potential solution to several sustainability problems, notably answering growing worldwide demand for agricultural commodities by increasing agricultural yields in developing countries, substituting biofuels for fossil fuels and providing acreage for offsetting carbon emissions. By contrast, opponents of LaSLA conceive of it as causing environmental effects that run counter to all three guidelines. In the following, I will critically discuss the arguments of proponents and opponents of LaSLA. The discussion aims at developing sustainability criteria for LaSLA. It is structured along the sustainability guidelines.

LaSLA and Efficiency

Proponents of LaSLA conceive of it as potentially contributing to efficiency by allowing to produce more commodities without increasing land-use. In contrast, opponents argue that even though LaSLA may indeed allow producing more agricultural commodities on the same amount of land, this is only possible while concurrently drawing on higher amounts of (non-renewable) inputs, such as (1) fossil fuels and inorganic fertilizers as well as (2) real capital (machinery and infrastructure) and (3) knowledge capital (more elaborated production techniques).

1. In so far as LaSLA can be conceived of as a substitution of the renewable resource land with non-renewable resources such as fossil fuel and inorganic fertilizers it does not qualify as contributing to strong sustainability. This is so because strong sustainability asks for the reverse, namely that non-renewable natural resources be substituted for by renewable natural resources (Daly 1991; Constanza and Daly 1992). First, it is constitutive of the concept of SD to acknowledge moderate scarcity in the assets necessary to achieve justice, that is, real, social and natural capital. In so far as certain aspects of these assets are finite, SD asks that they should be substituted for by non-finite aspects. Accordingly, it is part and parcel of the concept of SD to claim that non-renewable resources as a finite part of natural capital should be substituted for by other forms of capital. Second, renewable resources do belong to the realm of natural capital. Therefore, claiming that non-renewable resources should be substituted for by renewable resources does not contradict the constitutive claim of strong sustainability that natural capital cannot be substituted for by other forms of capital.[17]

[17] Note that in a way the claim that non-renewable natural resources should be substituted for by renewable natural resources does also constitute a strong sustainability guideline.

2. In so far as LaSLA is conceived of as a substitution of natural capital by real and knowledge capital, the question if LaSLA can be evaluated as contributing to sustainability can be traced back to the question if and in how far natural capital can be substituted by real capital. While weak sustainability holds that substitutions between real and natural capital are possible, strong sustainability argues that such substitutions are strictly limited (Neumayer 2010).
3. Finally, insofar as LaSLA is conceived of as a substitution of natural capital with knowledge capital, the question if LaSLA can be evaluated as contributing to sustainability is based on if and in how far natural capital can be substituted by other forms of capital. To my knowledge, most theoretical conceptions of sustainability do not address this question. While a detailed conceptual discussion of this issue would exceed the scope of this paper, in the more practical realm it seems intuitively plausible to conceive of the possibility to produce more products from a given amount of land by drawing on more elaborated production methods which do not rely on higher input in terms of non-renewable resources or real capital (e.g., agroecological production methods) as contributing to efficiency.

What we can gain from this discussion is that answering the question if LaSLA can be conceived of as contributing to efficiency depends on the manner in which LaSLA is implemented. Projects characterized by the typical, high-input, highly mechanized way of industrialized agriculture cannot be conceived of as more efficient. By contrast, projects aiming at changes in production methods building mainly on knowledge capital offer potential in terms of efficiency.

LaSLA and Consistency

In regard to the guideline of consistency, which asks for a reduction of negative feedbacks of anthropogenic production and consumption on natural capital, I mentioned two issues: (1) Proponents of LaSLA argue that biofuels contribute to consistency because they allow for a reduction of GHG-emissions. In contrast, (2) opponents of LaSLA apprehend negative impacts of large-scale, industrialized agriculture on natural capital and thus argue that LaSLA runs counter to consistency.

1. Assuming biofuels to be carbon neutral neglects upstream chain emissions as well as emissions resulting from land use change. Different authors therefore differ considerably in their evaluation of GHG-reduction potentials of (different) biofuels. Some production methods are even estimated to increase instead of reduce GHG-emissions (Fargione et al. 2008; Searchinger et al. 2008; Gomiero et al. 2009, with further references). This means that biofuels only qualify as contributing to a reduction of GHG-emissions and thus as conducive in terms of consistency in so far as an analysis that includes emissions from land-use change and upstream emissions yields a reduction in GHG-emissions. In regard to the problem discussed here this means that LaSLA aiming at biofuel production would have to take great care to avoid directly or indirectly effecting GHG-increasing land-use changes. Only insofar as it adheres to this

condition can LaSLA aiming at biofuel production be evaluated as conducive towards consistency.

2. As discussed, opponents of LaSLA point to possible negative impacts of large-scale industrialized agriculture on natural capital. However, while it is clear that such negative effects can occur, it is questionable if they occur necessarily. Thus, IAAASTD (2009, pp. 152–153) argues that "[a] detailed assessment of the [negative] environmental impacts associated with productivity enhancing technologies concluded that empirical evidence for these associations only exists for three scenarios—salinity, lower soil fertility, and pesticides and health […]. Furthermore, many of the best documented environmental costs from agriculture are related to the misapplication of technologies or over-use of resources rather than to the direct impacts of technology per se." On the other hand, traditional small-scale, low-input cultivation practices can lead to severe nutrient depletion when fallow periods are shortened (Lavelle et al. 2005). Hence while some aspects of change in production methods, such as increase in monocropping, pesticide use and mechanization may be linked to negative environmental effects, other aspects, such as professional nutrient and water management offer potential for positive environmental effects as well. This is not to say that I hold that current land-deals actually exhibit such positive consequences. In contrast, the World Bank explicitly observes "a failure to articulate, implement and enforce environmental regulation" (Deininger and Byerlee 2011). However, I would like to make clear that LaSLA is not necessarily linked to such negative consequences. More positive consequences could occur if some sort of environmental regulation was enforced without impairment due to corruption or shortcomings in implementation and execution.[18]

LaSLA and Resilience

In regard to the guideline of resilience, asking for investment in natural capital, I also discussed two issues: (1) Proponents of LaSLA claim that carbon offsetting allows for mitigation of climate change and can thus be conceived of as investment in natural capital. Contrariwise, (2), opponents of LaSLA conceive of the conversion of land loss of natural capital.

1. In regard to carbon offsetting via LULUCF, two contentious issues encompass additionality and leakage. Additionality addresses the question if the project would have occurred in case the activity was not implemented as an offset project. Only if this is not the case can carbon reductions be attributed to the project (Kollmuss et al. 2008). Leakage describes unanticipated adverse effects outside the project boundaries that if taken into account would qualify as rebounds on the projects achievements. By way of example, if reforestation of

[18] Admittedly, such effects merely constitute improvements in comparison to the status quo. That is, sustainable intensification of small-holder-agriculture, e.g., agroforestry allows for similar if not higher improvements regarding agricultures environmental effects (cf. IAAAST 2009).

cultivated land displaces cultivation and local farmers clear forests elsewhere (outside the project boundaries), the GHG-emissions from this forest clearance constitute a carbon leakage (ibid.). The issues of additionality and leakage are of high relevance in regard to the question if LaSLA targeting carbon sequestration is likely to indeed achieve carbon reduction. This is so because in contrast to the investor perspective perceiving of vast tracks of land as unused or underused, land targeted for LaSLA will generally be under some kind of use (see below). In regard to afforestation and reforestation this means that if a certain area is to become forest again, there is a high probability that people having used this area so far will be displaced,[19] most likely onto marginal land more or less unsuitable for cultivation. Such displacement may likely lead to carbon leakage. This also occurs in REDD projects: If these projects indeed satisfy the criterion of additionality, this means that the forest under scrutiny would have been cleared if it were not for the offset-project. However, the problem consists in that forest clearance both by locals aiming at satisfaction of basic needs as well as by timber companies aiming for profit is demand-side driven. Therefore, as long as demand is not shifted, forestry offset projects will be accompanied by leakage (ibid.). Thus, carbon offsetting projects can be conceived of as contributing to resilience only in so far as they ensure the avoidance of leakage—that is, in so far as they avoid causing direct and indirect land use changes.

2. Land-use change necessarily implies negative environmental consequences (Guo and Gifford 2002; Murty et al. 2002; de Chazal and Rounsevell 2009). Land use change can occur either as direct effects of land-deals, in cases where these deals encompass land formerly not (obviously) cultivated or as indirect effects, when acquisition of a piece of land leads to displacement of local population into other, formerly not or not intensively cultivated areas. In regard to the environmental effects of land use changes, disagreement between proponents and opponents of LaSLAS does not concern the consequences of such conversions but rather the question if LaSLA necessarily leads to such conversions: Proponents of LaSLA assume the existence of areas suitable for rainfed cultivation that are not currently used as well as existence of areas which, though cultivated, can be characterized by a so called yield gap, that is, a difference between potential and actual yields. In regard to the latter, proponents of LaSLA imply that closing this "gap" constitutes a positive development (Blumenthal 2009; Deininger and Byerlee 2011). In contrast, opponents of LaSLA argue that land targeted for LaSLA will generally be under some kind of use. Land is not only used for cultivation but also for grazing, collection of fuel wood, biomass, wild fruits and nuts, medicinal plant,s and other natural products (Brown 2005; Cousins 2007; Clancy 2008;

[19] This does obviously not hold for land-used-techniques that are compatible with the existence of forests. However, if an area is currently un-forested and is under some kind of use it is probable that this kind of use is not compatible with the existence of forests. It bears the question if local population will be able to change their ways of life in general and their land-use-techniques in particular in ways that allow them to continue using an area that is covered by a carbon-offsetting scheme requiring afforestation and reforestation.

Hall 2011). Thus, if certain allegedly unused areas are cultivated, these utilizations will be drawn to other, possibly more marginal land, leading to the mentioned indirect environmental effects. Furthermore, land produces essential ecosystem services such as maintenance of water quality and soil fertility (Dufey et al. 2007). These may be diminished or lost if land is cultivated. Regarding the argument that closing the yield gap constitutes a positive development, opponents of LaSLA argue that improving agricultural productivity will usually be accompanied with and achieved through increasing mechanization and will thus lead to loss of livelihood for current users of the land (cf. Vermeulen and Cotula 2010; Blumenthal 2009). This is apprehended to lead to displacement of these users to currently unused or less used, probably more marginal, land. To sum up, this argument once more underlines the importance of avoiding direct and indirect land use changes.

LaSLA and Decreasing Demand

So far, the discussion has focused on those guidelines directly linked to handling of natural capital, that is efficiency, consistency and resilience. Thus, nothing was said in regard to the guidelines aimed at decreasing demand, namely, questioning population growth and sufficiency (see above). The analysis of the drivers of LaSLA yielded an important group of drivers consisting in rising demand for agricultural commodities: population growth, dietary changes and increasing urbanization. I argued that biofuel policies link the food market with the energy market, resulting in an unprecedented increase in demand for agricultural commodities. Thus, LaSLA is at least partially demand-side driven. In so far as LaSLA is conceived as a problem, either because of its environmental consequences or because of its social consequences, one way of addressing this problem is decreasing demand—either by countering population growth or by reducing consumption per capita.

In so far as growing populations are primarily located in less developed countries, measures aiming at slowing down population growth primarily target people in these countries. Naturally, a guideline to SD can only consist in actions that do not in themselves violate claims individuals can make in the name of sustainability. Thus in so far as direct population control (e.g., a one-child policy) are conceived of as violating direct claims for justice, they are not an option. Meanwhile it is known that improving women's literacy and the possibility to take on paid work generally result in lowering birth-rates (UNDP 2011; Sen 2007). Thus besides the fact that respective policies may be conceived as a demand of intragenerational justice, they can also be seen as conducive to sustaining natural capital.

In so far as both demand for food and energy is on average much higher in industrialized countries as compared to threshold and developing countries, sufficiency, that is consciously decreasing demand should prima facie focus on industrialized countries. Promising approaches consist in reducing consumption of meat and animal protein, reducing food waste and decreasing political support for biofuels or linking it to strict sustainability criteria.

Conclusion

I started this paper by introducing sustainability as encompassing two claims: direct claims for justice ask that all contemporary and future human beings should be able to live a decent human life. Indirect claims for justice encompass claims for handling real, social and natural capital such that it does not undermine contemporary and future humans' ability to live a decent human life. In conceptualizing natural capital, I sketched an argument in favor of strong sustainability and introduced four guidelines for humanity's handling of natural capital: decreasing demand, efficiency, consistency, and resilience. In the subsequent section, I framed LaSLA as a way of dealing with natural capital. To this end I described key drivers of LaSLA, arguments brought forward in favor of LaSLA as well as concerns about LaSLA's environmental consequences. I discussed to what degree these arguments explicitly or implicitly relate to guidelines for strong sustainability. This discussion showed that while proponents of LaSLA conceive of it as contributing to efficiency, consistency and resilience, opponents evaluate LaSLA as detrimental in regard to all these three guidelines. In the final subsection, I therefore critically discussed the arguments put forward by both proponents and opponents regarding the relation between LaSLA and the three guidelines. Finally, I pointed out that though neither proponents nor opponents actually broach the issue, the guideline of decreasing demand provides complementary advises regarding how to tackle the underlying reasons of LaSLA.

In conclusion, the critical discussion of arguments in favor and contra LaSLA yielded two important conditions. First, in regard to the question if and in how far LaSLA can be conceived of as conducive rather than detrimental to efficiency and consistency, the discussion pointed to the importance of the implementation or design of the projects. They determine if a project allows increased production in a sustainable manner (efficiency) as well as how far it succeeds in avoiding negative environmental effects (consistency). Second, in regard to the question (1) if and how far LaSLA can be conceived of avoiding losses of natural capital, (2) if and how far biofuels can be conceived of as conducive to consistency and (3) if and how far carbon offsetting can be conceived of as contributing to resilience, the discussion pointed to the importance of avoiding direct conversion of forested and non-forested but allegedly unused land towards agriculture as well as corresponding indirect land-use changes. Taking the argument that most if not all land in host countries is under some kind of use or is needed for maintenance of environmental flows seriously yields that to qualify as complying with strong sustainability LaSLA must not lead to cultivation of formerly uncultivated land.[20] Furthermore, the necessity of

[20] As discussed in section "Strong Sustainability as a Partial Conception of Sustainable Development" this is not to say that in real life decisions one might not advocate such a project—for example because of growing global demand for agricultural commodities to feed a rapidly growing population. It is only to say that such a project does not qualify as complying with claims for strong sustainability. One could of course argue that strong sustainability as a partial conception of SD is in principle not reconcilable with demands for direct claims for justice. That is, one could argue that given a growing population it will not be possible to "feed the world" and concurrently comply with strong sustainability guidelines for handling natural capital. I do not share this view. While an encompassing reasoning of my claim goes beyond the scope of this paper, I would like to briefly point out that my optimism builds on two issues

avoiding indirect land-use change due to displacement effects yields the necessity to adequately integrate or compensate current land users, even if they are not officially recognized as land owners.[21]

However, to address the avoidance of such direct and indirect land-use changes as well as questions regarding the design and implementation of projects needs to build on institutional capacities in the host countries. This shows that an exhaustive evaluation of LaSLA from a sustainability perspective cannot be confined to LaSLA as an instance of handling natural capital. Instead, it necessarily needs to encompass an analysis of the institutional framework (as part of social capital) under which the phenomenon takes place. Furthermore, and as pointed out in the introduction, such an analysis would have to address the social consequences of LaSLA.

Acknowledgments This contribution is based on a paper presented at the Eighth Annual Meeting of the International Society for Environmental Ethics (ISEE) "Old World and New World Perspectives on Environmental Philosophy," June 14–17th, 2011, Nijmegen, The Netherlands. Revised versions of the paper were also presented and discussed at the research seminar "The role of policy, law and ethics in sustainable bioenergy transition processes," November 23rd, Kopenhagen University and at the "International Workshop on Large-Scale Land Acquisitions," May 11th German Institute of Global and Area Studies (GIGA), Hamburg. I would like to thank the participants of these events, especially Luis Tomás Montilla Fernández, for discussion and constructive critique. Furthermore I would like to thank Konrad Ott, Kerstin Nolte, Setareh Stephan, Tanja von Egan-Krieger, Christian Baatz and Yogi Hendlin and two anonymous reviewers for comments and assistance with this paper. Finally, I gratefully acknowledge financial support of the program "Economics for Sustainability" by the German Federal Ministry of Education and Research.

References

Anseeuw, W., Boche, M., Breu, T., Giger, M., Lay, J., Messerli, P., et al. (2012). Transnational land deals for agriculture in the global south: Analytical report based on the land matrix database. April 2012. Number 1: April 2012. http://www.landcoalition.org/sites/default/files/publication/1254/Analytical%20Report%20Web.pdf. Accessed May 9, 2012.

Batey, T. (2009). Soil compaction and soil management—A review. *Soil Use and Management, 25*, 335–345.

Baumgärtner, S., & Quaas, M. (2009). Ecological-economic viability as a criterion of strong sustainability under uncertainty. *Ecological Economics, 68*, 2008–2020.

Biesecker, A., & Hofmeister, S. (2010). Focus: (Re)productivity: Sustainable relations both between society and nature and between the genders. *Ecological Economics, 69*, 1703–1711.

Blumenthal, G. R. (2009). Investor's perspectives on farmland. In M. Kugelman & S. L. Levenstein (Eds.), *Land grab? The race for the worlds farmland* (pp. 55–68).

BMZ (Bundesministerium für wirtschaftliche Zusammenarbeit). (2009). Development policy stance on the topic of land grabbing—The purchase and leasing of large areas of land in developing countries

Footnote 20 continued
amongst others: First, as mentioned but not extensively discussed in this paper, strong sustainability places imminent importance on the guideline of decreasing demand by reducing consumption in industrialized countries (i.e., sufficiency, cf. Voget-Kleschin 2012). Second, direct claims for justice encompass claims for gender equality, inter alia enhancing women's literacy rates and the possibility to take on paid work. It is known that these processes generally result in lowering the birth-rate. (see above).

[21] There are compelling reasons for integration/participation as well as compensation of local land users on the ground of considerations of intragenerational justice. (cf. Voget-Kleschin and Khalilian in this issue) However, the point I would like to emphasize here is that additionally this argument is also supported by environmental reasons, namely the necessity to avoid indirect land-use-change due to displacement effects.

(Discourse 15). http://www.donorplatform.org/component/option,com_docman/task,doc_view/gid,1162/. Accessed September 7, 2010.
Borras, S., & Franco, J. (2010). Towards a broader view of the politics of global land grab: Rethinking land issues, reframing resistance (ICAS Working Paper Series 001). http://www.tni.org/sites/www.tni.org/files/Borras%20Franco%20Politics%20of%20Land%20Grab%20v3.pdf. Accessed July 14, 2010.
Borras, S. M., Franco, J. C., Gómez, S., Kay, C., & Spoor, M. (2012). Land grabbing in Latin America and the Caribbean. *Journal of Peasant Studies,*. doi:10.1080/03066150.2012.679931.
Brand, F., & Jax, K. (2007). Focusing the meaning(s) of resilience: Resilience as a descriptive concept and a boundary object. *Ecology and Society, 12*(1), 23.
Braun, J. von, & Meinzen-Dick, R. (2009a). "Land grabbing" by foreign investors in developing countries: Risks and opportunities (IPRI policy brief). http://www.landcoalition.org/pdf/ifpri_land_grabbing_apr_09.pdfhttp://www.ifpri.org/sites/default/files/publications/bp013all.pdf. Accessed June 18, 2012.
Brown, T. (2005). Contestation, confusion and corruption: Market-based land reform in Zambia. In S. Evers, M. Spierenburg, & H. Wels (Eds.), *Competing jurisdictions: Settling land claims in Africa* (pp. 79–108). Leiden: Brill Academic Publishers.
Bruinsma, J. (2009). The resource outlook to 2050: By how much do land, water and crop yields need ton increase by 2050? Expert meeting on how to feed the world in 2050. FAO (Food and Agriculture Organization), Rome, June, 24.
Burger, P., & Christen, M. (2011). Towards a capability approach of sustainability. *Journal of Cleaner Production, 19*(8), 787–795.
Caney, S. (2010). Climate change and the duties of the advantaged. *Critical Review of International Social and Political Philosophy, 13*(1), 203–228.
Christen, M., & Schmidt, S. (2011). A formal framework for theories of sustainability. Sustainable Development, n/a–n/a.
Clancy, J. S. (2008). Are biofuels pro-poor? Assessing the evidence. *European Journal of Development Research, 20*(3), 416–431.
Constanza, R., & Daly, H. E. (1992). Natural capital and sustainable development. *Conservation Biology, 6*(1), 37–46.
Cotula, L., & Vermeulen, S. (2009). Deal or no deal: The outlook for agricultural land investment in Africa. *International Affairs, 85*(6), 1233–1247.
Cotula, L., Vermeulen, S., Leonard, R., & Keeley, J. (2009). *Land grab or development opportunity?: Agricultural investment and international land deals in Africa*. Rome: London. http://dlc.dlib.indiana.edu/dlc/bitstream/handle/10535/6178/land%20grab%20or%20dev%20opportunity.pdf?sequence=1. Accessed 2 Mar 2012.
Cousins, B. (2007). Agrarian reform and the 'two economies': Transforming South Africa's countryside. In L. Ntsebeza & R. Hall (Eds.), *The land question in South Africa: The challenge of transformation and redistribution* (pp. 220–247). Cape Town: HSRC Press.
Daly, H. E. (1991). Elements of environmental macroeconomics. In R. Costanza (Ed.), *Ecological economics: The science and management of sustainability. Workshop. 24–26 May 1990* (pp. 32–46). New York: Columbia University Press.
Daly, H. E. (1996). *Beyond growth: The economics of sustainable environment*. Boston, Mass: Beacon Press.
de Chazal, J., & Rounsevell, M. D. (2009). Land-use and climate change within assessments of biodiversity change: A review. *Global Environmental Change,*. doi:10.1016/j.gloenvcha.2008.09.007.
Deininger, K., & Byerlee, D. (2011). Rising global interest in farmland: Can it yield sustainable and equitable benefits? http://siteresources.worldbank.org/INTARD/Resources/ESW_Sept7_final_final.pdf. Accessed June 18, 2012.
Dent, D., Asfary, A. F., Giri, C., Govil, K., Hartemink, A., Homgren, P., et al. (2007). Land. In UNEP (United Nations Environmental Programme) (Ed.), Global environment outlook 4: Environment for development (pp. 81–114). Nairobi, Kenya: United Nations Environment Programme.
Dobson, A. (2003). *Justice and the environment: Conceptions of environmental sustainability and theories of distributive justice*. Oxford: Oxford University Press.
Dufey, A., Vermeulen, S., & Vorley, B. (2007). Biofuels: Strategic choices for commodity dependent developing countries. http://www.iied.org/pubs/pdfs/G02587.pdf. Accessed September 7, 2010.

Easterling, W. E., Aggarwal, P. K., Batima, P., Brandner, K. M., Erda, L., Howden, S. M., et al. (2007). Food, fibre and forest products. In M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. van der Linden, & C. E. Hanson (Eds.), *Climate change 2007: Impacts, adaptation and vulnerability: Contribution of working group II to the fourth assessment report of the intergovernmental panel on climate change* (pp. 273–313). Cambridge: Cambridge University Press.

Fargione, J., Hill, J., Tilman, D., Polasky, S., & Hawthorne, P. (2008). Land clearing and the biofuel carbon debt. *Science, 319*(5867), 1235–1238.

Fischer, G. (2009). *World food and agriculture to 2030/50: How do climate change and bioenergy alter the long-term outlook for food, agriculture and resource availability?* FAO (Food and Agriculture Organisation).

Fischer, G. (2011). How can climate change and the development of bioenergy alter the long-term outlook for food and agriculture? In P. Conforti (Ed.), *Looking ahead in world food and agriculture: Perspectives to 2050* (pp. 95–155). Rome: Food and Agriculture Organization of the United Nations.

Gardiner, S. M. (2004). Ethics and global climate change: Survey article. *Ethics: An International Journal of Social, Political, and Legal Philosophy, 114*(3), 555–600.

Gomiero, T., Paoletti, M. G., & Pimentel, D. (2009). Biofuels: Efficiency, ethics, and limits to human appropriation of ecosystem services. *Journal of Agricultural and Environmental Ethics, 23*(5), 403–434.

Graham, A., Aubry Sylvain, Künnemann, R., & Suárez, S. M. (2010). Land grab study: CSO monitoring 2009–2010 "Advancing African Agriculture" (AAA): The impact of Europe's policies and practices on African agriculture and food security. http://fian.org/resources/documents/others/report-on-land-grabbing/pdf. Accessed August 30, 2010.

Grain (2008). Seized! The 2008 landgrab for food and financial security (Grain briefing). Accessed June 3, 2010.

Guo, L. B., & Gifford, R. M. (2002). Soil carbon stocks and land use change: A meta analysis. *Global Change Biology,*. doi:10.1046/j.1354-1013.2002.00486.x.

Hall, R. (2011). The many faces of the investor rush in Southern Africa: Towards a typology of commercial land deals (ICAS Review Paper Series 2). University of Groningen, Netherlands. http://www.tni.org/sites/www.tni.org/files/Hall%20ICAS%20WP%202.pdf. Accessed April 13, 2011.

Hamza, M. A., & Anderson, W. K. (2005). Soil compaction in cropping systems: A review of the nature, causes and possible solutions. *Soil & Tillage Research, 82*, 121–145.

IAAAST (2009). Agriculture at a crossroad: International assessment of agricultural knowledge, science and technology for development. IAAAST. http://www.agassessment.org/reports/IAASTD/EN/Agriculture%20at%20a%20Crossroads_Global%20Report%20(English).pdf. Accessed June 28, 2010.

International Energy Agency (IEA) (2010). *World energy outlook 2010*. Paris: International Energy Agency.

Kollmuss, A., Zink, H., & Polycarp, C. (2008). Making sense of the voluntary carbon market: A comparison of carbon offset standards. http://tricorona.de/files/93ea78fc52f9fdaf0048dcf866d73004wwf_standcomp_080305_web.pdf. Accessed April 19, 2011.

Kugelman, M. (2009). Introduction. In M. Kugelman, S. L. Levenstein & C. Atkin (Eds.), *Land grab?: The race for the world's farmland* (pp. 1–23). Washington, DC: Woodrow Wilson International Center for Scholars.

Lavelle, P., Dugdale, R., Scholes, R., Berhe, A. A., Carpenter, E., Codispoti, L., et al. (2005). Nutrient cycling. In R. M. Hassan, R. Scholes, & N. Ash (Eds.), *Ecosystems and human well-being: Current state and trends* (pp. 331–353). Washington, DC: Island Press.

Meinzen-Dick, R. M. H. (2009). Necessary nuance: Toward a code of conduct in foreign land deals. In M. Kugelman, S. L. Levenstein & C. Atkin (Eds.), *Land grab?: The race for the world's farmland* (pp. 69–81). Washington, DC: Woodrow Wilson International Center for Scholars.

Merlet, M., & Jamart, C. (2009). Commercial pressures on land wordwide: Issues and conceptual framework. http://www.landcoalition.org/pdf/09_05_Conceptual_framework_ENG.pdf. Accessed June 22, 2010.

Mitchell, D. (2008). A note on rising food prices (Policy Research Working Paper 4682). http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2008/07/28/000020439_20080728103002/Rendered/PDF/WP4682.pdf. Accessed September 17, 2010.

Montemayor, R. Q. (2009). Overseas farmland investments—Boon or bane for farmers in Asia? In M. Kugelman, S. L. Levenstein & C. Atkin (Eds.), *Land grab?: The race for the world's farmland* (pp. 95–107). Washington, DC: Woodrow Wilson International Center for Scholars.

Muraca, B. (2009). Nachhaltigkeit ohne Wachstum? Auf dem Weg zur Décroissance. In T. von Egan-Krieger, J. Schultz, P. Thapa, & L. Voget (Eds.), *Die Greifswalder Theorie starker Nachhaltigkeit: Ausbau, Anwendung und Kritik*. Marburg: Metropolis.

Muraca, B., & Voget-Kleschin, L. (2011). Strong sustainability across culture(s). In G. Banse (Ed.), *Sustainable development—The cultural perspective: Concepts-Aspects-examples* (pp. 187–203). Berlin: Edition sigma.

Murty, D., Kirschbaum, M. U. F., Mcmurtrie, R. E., & Mcgilvray, H. (2002). Does conversion of forest to agricultural land change soil carbon and nitrogen? A review of the literature. *Global Change Biology,*. doi:10.1046/j.1354-1013.2001.00459.x.

Neumayer, E. (2010). *Weak versus strong sustainability: Exploring the limits of two opposing paradigms* (3rd ed.). Cheltenham [u.a.]: Edward Elgar.

Norton, B. G. (2005). *Sustainability: A philosophy of adaptive ecosystem management*. Chicago: University of Chicago Press.

Oakland Institute (2011). Understanding land investment deals in Africa: The myth of job creation (Land Deal Brief). http://www.oaklandinstitute.org/sites/oaklandinstitute.org/files/OI_brief_myth_job_creation_0.pdf. Accessed November 29, 2012.

Ott, K., & Döring, R. (2008). Theorie und Praxis starker Nachhaltigkeit (2nd edn, Beiträge zur Theorie und Praxis starker Nachhaltigkeit, Vol. 1). Marburg: Metropolis-Verl.

Page, E. A. (2007a). Intergenerational justice of what: Welfare, resources or capabilities? *Environmental Politics, 16*(3), 453–469.

Page, E. A. (2007b). Justice between generations: Investigating a sufficientarian approach. *Journal of Global Ethics, 3*(1), 3–20.

Pretty, J. (2008). Agricultural sustainability: Concepts, principles and evidence. *Philosophical Transactions of the Royal Society of Biological Sciences, 363*, 447–465.

Rawls, J. (2005). *A theory of justice*. Cambridge, MA: Belknap Press.

Schultz, J., Brand, F., Kopfmüller, J., & Ott, K. (2008). Building a 'theory of sustainable development': Two salient conceptions within the German discourse. *Environment and Sustainable Development, 7*(4), 465–482.

Searchinger, T., Heimlich, R., Houghton, R. A., Dong, F., Elobeid, A., Fabiosa, J., et al. (2008). Use of U.S. Croplands for biofuels increases greenhouse gases through emissions from land-use change. *Science, 319*(5867), 1238–1240.

Sen, A. K. (2007). *Development as freedom* (13th ed.). Oxford: Oxford University Press.

Spieldoch, A., & Murphy, S. (2009). Agricultural land acquisitions: Implications for food security and poverty alleviation. In M. Kugelman, S. L. Levenstein & C. Atkin (Eds.), *Land grab?: The race for the world's farmland* (pp. 39–53). Washington, DC: Woodrow Wilson International Center for Scholars.

Technical committee on 'land tenure and development'. (2010). Large scale land appropriations: Analysis of the phenomenon and proposed guidelines for future action. http://www.agter.asso.fr/IMG/pdf/appropriation__en_web-finale.pdf.

UNCTAD (United Nations Conference on Trade and Development), & UNEP (United Nations Environmental Programm) (2008). Organic agriculture and food security in africa. http://www.unctad.org/en/docs/ditcted200715_en.pdf.

United Nations Development Programm (UNDP). (2011). *Human development report 2011: Sustainability and equity: A better future for all*. New York, Basingstoke: Palgrave Macmillan.

Vermeulen, S., & Cotula, L. (2010). Making the most of agricultural investment: A survey of business models that provide opportunities for smallholders. http://www.iied.org/pubs/pdfs/12566IIED.pdf. Accessed June 22, 2010.

Voget-Kleschin, L. (2012). Employing a normative conception of sustainability to reason and specify green consumerism. In T. Potthast & S. Meisch (Eds.), *Climate change and sustainable development: Ethical perspectives on land use and food production: EurSAFE 2012, Tübingen, Germany, 30 May–2 June 2012* (pp. 361–366). Wageningen, the Netherlands: Wageningen Academic Publishers.

Wily, L. A. (2011). The tragedy of public lands: The fate of the commons under global commercial pressure (Commercial Pressures on Land). http://www.landcoalition.org/sites/default/files/publication/895/WEB_WILY_Commons_final_layout.pdf. Accessed February 2, 2011.

World Commission on Environment and Development (WCED). (1987). *Our common future*. New York: Oxford.

Zoomers, A. (2010). Globalisation and the foreignisation of space: Seven processes driving the current global land grab. *Journal of Peasant Studies, 37*, 429–447.