Food and Agriculture Organization
of the United Nations

Guidelines for sustainable large-scale land deals in Africa

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ABBREVIATIONS AND SYMBOLS

Al	Aluminum
BOD	Biological Oxygen Demand
C	Carbon
Ca	Calcium
CEC	Cation Exchange Capacity
COD	Chemical Oxygen Demand
DRC	Democratic Republic of the Congo
dS/metre	deciSiemens per meter
EC	Electrical Conductivity
EC_e	Electrical Conductivity of the Saturation Extract
EMS	Environmental Management System
ESIA	Environmental and Social Impact Assessment
ESP	Exchangeable Sodium Percentage
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign Direct Investment
Fe	Iron
GLP	Global Land Project
GTZ	German Technical Cooperation
GWP-TEC	Global Water Partnership
IFAD	International Fund for Agricultural Development
IFC	International Finance Cooperation
IFPRI	International Food Policy Research Institute
IIED	International Institute for Environment and Development
ILRF	International Labour Rights Forum
ISO	International Standard Organization
IWRM	Integrated Water Resources Management
K	Potassium
meq	Milliequivalent
N	Nitrogen
OC	Organic carbon
OM	Organic matter
P	Phosphorus
ppm	Parts per million
SOM	Soil Organic Matter
TDS	Total Dissolved Salts
TOC	Total Organic Carbon
UNCTAD	United Nations Conference on Trade and Development
USD	United States Dollar
WRM	World Rainforest Movement
WSRR	World Soil Resources Reports

Over the last few years, agribusinesses, investment funds and government agencies have demonstrated a growing interest in acquiring large portions of land, mostly in developing countries and particularly in sub-Saharan Africa. In the host countries, investors and government see these acquisitions as opportunities to attract foreign investment that will enhance food and energy security and stimulate socio-economic development. Analysing a number of these deals in Africa suggests that these objectives are usually not attained and that their sustainability appears to be uncertain.

Even though tenants and landlords take into account environmental aspects when negotiating land deals, there is a lack of technical measures and tools to guide these negotiations. The aim of this document therefore is to provide technical guidelines to be used as a tool that may foster an enabling environment for sustainability and provide a basis for win-win investments that effectively contribute to the socio-economic development of the host countries; this is feasible when the arrangements benefit both the investors and the majority of the population in the given area.

The following points need to be taken into consideration when implementing the Guidelines: demand for agricultural land in Africa, land productive capacity in land valuation, environment for large-scale land deals to be sustainable, and monitoring the land quality:

1. The increasing demand for agricultural land in Africa

Although foreign nationals have been engaged in African agriculture since colonial times, the strong demand, scale and speed of land acquisitions over the past few years have been unprecedented and are raising a lot of concerns. Many drivers for this strong demand have been identified and include: global food security and sovereignty concerns; bio-fuel and energy security; investments to cash in carbon sinks/carbon markets; attractive agricultural investment linked to global high food prices; securing raw materials that sustain industrialization in some countries; and speculation that land values will continue to increase.

Reliable figures on the scale and trends of land acquisition are still scarce. Several actors such as FAO, have been compiling databases on large-scale (greater than 1000 ha) land acquisitions in Africa from the year 2000 to date. These database indicate that a total of more than 117 large-scale land deals totalling about 22 million ha have been recorded in 21 African countries in the last 12 years. The land areas range from 1 000 ha to 10 million ha in size.

East Africa comprises 45 percent of these deals with Ethiopia accounting for about 27 percent of the total number of deals in Africa. Southern Africa follows with 31 percent. Regarding the distribution by geographic regions of the areas involved in the deals as a portion of the total area of land deals in Africa, the Central African region appears to largely dominate other regions with 61 percent and the highest proportion of its agricultural area (13 percent) allocated to land deals.

Regarding the number of deals and areas involved; out of a total of 88 deals for which the identity of the investor was known, 39 to 45 percent are Western/North American

companies while Asian countries come a distant second with about 26 percent. The activities and the investors plan to engage in vary, but may be classified into three main groups: food crop production; production of industrial crops for human consumption and for biofuels; and forest conservation for carbon sinks/carbon trading; mining.
Contrary to what is often claimed, most large-scale land deals in Africa do not encompass marginal or infertile land. Instead, these deals have incorporated fertile land close to infrastructure such as roads, railways and ports and near to water resources to allow access to irrigation.
Generally, the value of the land is underestimated and no consideration is given to the productive capacity of the land. In addition, farmers are usually not fully involved in the negotiation process divesting them of their ancestral lands with little or no compensation for the loss of their livelihood. In many countries, poor land governance, the lack of transparency and the weak involvement of the local population in the decision-making process invariably help to undermine the host country's position.

2. Land productive capacity in the economic valuation of land

Most land deals in Africa involve leasing comprising rental fees and in some cases the investors are given up to 99 years leases. However, rent fees are very low. This is attributed firstly to the land being inadequately valued and secondly to not giving due consideration to the land's productive capacity. The appraisal should be based on economic principles that take into account the land's productive capacity and the best use options while at the same time considering sustainability. This will result in better market prices for land in such deals.
Therefore, the following land residual method is suggested to calculate the rental or economic value of the land, allowing for improving the land use to its highest potential. All operating expenses and the return attributable to other agents of production are deducted. The net annual income per ha imputed to the land is capitalized to derive an estimate of the land's value. The land rental value per ha and the land's value can be calculated from:

Rental value per ha = Net annual income per ha
= (Total income of highest and best use - total production costs) per ha
Land value per ha = Rental value per ha / capitalization rate

A proposed guideline of attainable crop yield as a fraction of the potential maximum yield for different suitability classes is then used to obtain the expected yield.
The land data required to determine the expected yields for a given crop include the following:

- Soil quality
- Climate – adequate temperature and availability of water
- Topography and the quality of the location

In order to determine the land value using the land residual method, additional information such as production costs, market prices of crops to be grown, transportation costs to markets etc., will be required.

3. Enabling environment for large-scale land deals to be sustainable

Win-win investments for both the population of the host country and for investors ensure the sustainability of large-scale land deals. This means that these acquisitions should be: socially, culturally and politically correct; environmentally friendly; and economically mutually profitable. Moreover, they should contribute to developing the area in which the land is located, both on a social and economic level. To date, most of the deals concluded in Africa are not perceived as win-win arrangements as there is little or no monitoring of the land use in terms of sustainability and social responsibility of the investors.

If properly carried out, large-scale land deals can be effective development opportunities for the host country and the concerned communities. It can result in win-win investments. The following safeguards can bring about an enabling environment for these deals to be sustainable and should be considered in decision-making:

- Establish Master land use plans at appropriate level (local, regional and/or national) based on agro ecological zones and land quality.
- Establish effective water governance, with watershed integrated water resources management plans.
- Follow the Equator Principles, which include carrying out an Environmental and Social Impact Assessment (ESIA) and developing an environmental action plan.
- Implement FAO's Voluntary Guidelines for Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security, which include effective land tenure governance, securing local rights and market development as the means to transfer tenure rights of use and ownership.
- Carry out an economic land estimate that incorporates the land's productive capacity and foresees adequate compensation for negative social and environmental impacts that cannot be mitigated. This should be carried out after the ESIA has been completed.
- Set up a multidisciplinary negotiating team of a minimum of five to seven world-class specialists comprising a legal expert, an economist or agro/environmental economist, an environmentalist , a land specialist or soil scientist; a socio-economist or sociologist, a negotiation specialist, and an agronomist.
- Consider options other than land sale or lease; negotiate deals that ensure that the decision-making is based on substantiated information and involves the population affected by the arrangements.
- Set-up a monitoring system that will keep track of the environment and land's quality to minimize land degradation and enhance environmental sustainability during the whole period of the deal/lease.
- Encourage climate-smart agriculture practices to maintain land quality. This includes conservation agriculture, agro-forestry and maintaining riparian forest buffers.

4. Monitoring the land quality

These large-scale land deals usually have long leases that meet development projects' long-term land security requirements. Monitoring land quality should therefore match this time period. Including a clause in the land deal contract requiring that the investor's operations be certified through the International Standard Organization (ISO) system using the ISO 14 001 standard, will ensure compliance with environmental sustainability requirements. ISO certification is highly attractive for investors and ensures that they set up an Environmental Management System (EMS) to collect data then audited by a certification authority that can warrant compliance. To obtain an ISO 14001 certification, it is currently mandatorily required to comply with:

- prevailing environmental legislation and regulations and continual improvement and prevention of pollution.
- "other requirements to which the organisation subscribes, that are applicable to the environmental aspects of its activities, products and/or services".

ISO 14 001 does not establish the levels of environmental performance, which are to be defined nationally. For land deals, the target level of performance should be to strive to meet values of key land quality indicators measured before the development of the land.

A system of incentives for ISO 14 001 compliance and penalties in the case of non-compliance should be put into place.

In addition to the ISO 14 001 certification, the landowner should periodically monitor the land quality as the critical factor in land management is to maintain or enhance its quality. This comprises four aspects that can minimize land degradation and ensure that the land maintains its intrinsic qualities:

- Soil quality
- Biodiversity
- Carbon sequestration
- Watershed health

Selected indicators for the above parameters will enable the landowner to monitor, analyse and report trends and performance. The data set proposed in these guidelines can be used to carry out a land quality assessment resulting in a reliable estimate of the land's overall condition and to assess changes in land quality over time.

The baselines values of the data sets minimum parameters should be determined during the Environmental and Social Impact Assessment, which should be conducted before the deal is signed.

CHAPTER 1

INTRODUCTION

CHAPTER 1 - INTRODUCTION

1.1. General Background

Land is the entire non-reproducible, physical universe, including all natural resources. The entire material universe (including air, sunshine, trees, water, soils and minerals) outside of people themselves and the products of people is categorized as land (Fisher, 1987) Land supports life and is at the centre of human culture and institutions. Thus, land holds a unique and pivotal position in the social, political, environmental and economic life of human beings. As a resource, land is different from other commodities due to its unique physical and functional characteristics. Physically, first, land can neither be manufactured nor reproduced. Thus in the economic sense, land has no cost of production - it is nature's gift to mankind. Second, land is immobile. This feature prevents land from being physically moved to a better market place. Third, land is physically indestructible and will remain forever; however, obsolescence of use may destroy the land's value or economic durability. Fourth, no two parcels of land are exactly alike physically; they differ in at least their geographic location. Fifth, although the physical supply of land is fixed, there is no real shortage of land in total supply. However, certain types of land in given locations may be in short supply - for example, arable land, serviced lots within the municipal boundaries or river lots may be scarce.

Functionally, land can be considered for at least four different functional dimensions. Firstly, land is an endowment, a source and bank of minerals, water and nutrients vital for economic activity (industry) and sustaining life (foods). Second, land is a physical place for carrying out vital socio-economic production and reproduction functions, for example – factories, residences, food (production, grazing, gathering, fishing, hunting), for commerce (distribution/transportation, storage, marketing/exchange of vital services and goods such as food), recreation and environmental conservation. Third, land is an economic asset that can be exchanged or sold, rented or pledged as collateral for borrowing funds to enable consumption or invest in economic activities. Fourth, land is a social, cultural and ontological resource that remains an important factor in the construction of social identity, the organization of religious life and the production and reproduction of culture, within and across generations of families, lineages and communities that share and control a given physical location on the surface of the earth.

The foregoing unique characteristics make land a critical resource to life and economic development, at the same time, a contentiously difficult resource to manage. As such land needs to be handled with particular attentions using proper tools and tested methodologies. Failure to do so will create conflict, instability, poverty and lack of security of tenure. Land tenure security is the right to remain on one's land and make use of and profit from that land in ways the individual or groups value (so long as they do not harm others), without fear of eviction. Security of tenure provides confidence for investors on land by guaranteeing them that their investment will mature and reap dividends without disruptions. This is so because once capital expenditures have been committed for improvements on the land, the investment becomes fixed in place and, for all intents and purposes, permanent. For example, irrigation drainage, electricity, water facilities, etc. cannot be economically dismantled and shifted to other locations where they might be in greater demand.

As highlighted by various authors, within national boundaries, land and its inherent natural endowments (plant nutrients, minerals, fossil fuels, etc.) constitute a country's richness. It is the basis for its wealth and wealth creation, the area of its physical and political strengths and the source of its people's cultural identity, livelihoods and very survival, including environmental services for the present and future generations. As such, any sale or long-term lease of large tracts of land to non-residents needs to be cautiously assessed against any potential infringements of the rights, "gifts of nature" and cultural identity enjoyed by indigenous people. In this regard, careful consideration and consultation should be given to how much land is leased, for how long and at what price.

1.2 Leaders Perception

African leaders are increasingly opting for an agriculture-led industrialization in order to stimulate socio-economic development and alleviate poverty. This calls for improving the very low agricultural productivity that prevails in Africa, especially in sub-Saharan Africa, and thus requires considerable investments that will create the appropriate environment to successfully modernize agriculture. African governments therefore welcome foreign direct investments to reach this objective. Investors and governments of host countries are thus promoting large-scale land acquisitions as opportunities to attract foreign investment that will hopefully enhance food and energy security and stimulate socio-economic development.

The analysis of many large-scale land deals in Africa suggests that there is still challenges to address to attain the above noble objectives. Many of these deals lack sustainability and can neither be considered as a win-win for investors nor for the majority of the host countries' population. Even though tenants and landlords do take environmental aspects into account when negotiating land rent in these deals, there are no specific guidelines with objective technical measures. Furthermore, the current situation reveals the need for relevant guidelines that can promote the sustainability of the deals.

1.3. Why the Guidelines

In light of this, these Guidelines aim at providing tools for equitable and sustainable land deals to policy makers, line ministries, regulatory bodies, negotiators, investors, planners, local government's authorities, traditional leaders, and investment authorities and directorates. Any negotiation is enhanced by a common and collective understanding and the guidelines could be used to enhance land deals for the mutual benefit of all. It provide advice and technical tools to create an enabling environment for land deals to be environmentally sustainable and effectively contribute towards the socio-economic development notably of the host countries.

Key points

(i) African governments aim to enhance food and energy security and stimulate socio-economic development.

(ii) Large-scale land acquisitions are promoted by governments as opportunities to attract foreign investment into agriculture.

(iii) This publication provides advice and technical tools to create an enabling environment for land deals to be environmentally sustainable and effectively contribute towards the socio-economic development of host or all participating countries and communities.

CHAPTER 2

INCREASING DEMAND FOR LAND IN AFRICA

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2.1 Context

Over the last few years, agribusinesses, investment funds and government agencies have shown a growing interest in purchasing or long-term leasing of large portions of land, mostly from developing countries and particularly in sub-Saharan Africa (De Schutter, 2009; Cotula, 2011).

Countries in sub-Saharan Africa have been prime targets because the region is perceived to have:

- Plenty of available "underutilized" arable land. For example, according to FAO estimates, 550 million ha of arable land are available in Central Africa, and currently only about 5 percent are cultivated.
- A favourable climate for the production of a wide range of crops.
- Abundant water resources. For example, in the year 2000, only about 0.09 percent of the total renewable water resources were utilised in Central Africa, (Fonteh, 2008).
- Abundant human resources and relatively cheap labour force.

Even though no definitive assessment has been made on the extent of land deals and their prices[1] across Africa, when compared to other regions, land is offered for relatively cheaper prices and/or could even be acquired for free. Examples of these low prices can be found in Heong (2011): in Sierra Leone, the rental value of agricultural land for large-scale land deals is about USD 2/ha/year; in Ethiopia, the rental value of land leased to an Indian company was initially USD 1.25/ha/year but this was later renegotiated to USD 6.75/ha. Cotula (2011) suggests that, in 2006, Cameroon obtained the best rental price with USD 13.8 /ha/year.

The Oakland Institute (2011) reports that Mali leased land for free in a land deal. In comparison, values practiced in two newly industrialized countries illustrate how low these prices are. In Brazil the average price of agricultural land is USD 2 710/ha (Ag News Brazil, 2011). Assuming a capitalization rate of 10 percent, the average land rental in Brazil is roughly USD 271/ha/year. In South Africa, grazing land just outside Pretoria is estimated to have a rental value around USD 350/ha/year (FreePropertyAds, 2011).

2.2 Historical Perspective on Land Acquisitions in Africa

Large-scale land acquisition in Africa is not a new phenomenon; it began during the colonial era. According to the WRM (2010), colonial powers invaded Africa and claimed ownership rights on land through armed force over local people. Most large-scale agriculture plantations found in Africa today simply perpetuate the plantation model established during colonial times and examples include:

Cameroon

Tande (2006) reports that the Germans during colonial era stripped 200 000 acres (81 000 ha) from the Bakweri people living in the foothills of the Buea Mountain in Cameroon. The British acquired the land after the First World War and established an agro-industrial corporation called the Cameroon Development Corporation with rubber, oil palm and banana plantations.

Congo Republic

In the Congo Republic, at the end of the 19th century, the French colonial power obtained a 700 000 ha concession to grow rubber and exploit wood resources (Leonard, 2008).

Democratic Republic of Congo

In April 1911, the country was known as "Belgian Congo" and Lever Brothers signed a pact with the Government to gradually increase palm oil production, which covered about 147, 000 ha in 1958 (AGRER – EARTH Gedif, 2005).

Kenya

According to various sources, in 1906, Hugh Cholmondeley Delamere, a British settler in Kenya, obtained a 99-year lease on 100,000 acres (40, 400 ha) that he named "Equator Ranch". That same year he also acquired a large farm in Gilgil division, (20,000 ha) . Together, these vast possessions made Delamere one of Kenya's 'largemen' – the local name for the handful of colonists with the greatest land holdings.

There are other huge tracks of land leased for 99 years and these include several companies.

Liberia

In 1926, Firestone Tire and Rubber Company obtained a 99 years lease for one million acres (404 000 ha) of Liberia's rich tropical forest (about 4 percent of country's entire landmass), for an annual rent of USD 0.15 per ha (ILRF, 2009).

Uganda

In Uganda, the 1900 Buganda Agreement commonly known as the Uganda Agreement allocated 1500 sq. miles (385 000 ha.) of forests, uncultivated land and what was termed wasteland to Crown Land (Rugadya, 1999).
However the more recent increased interest in land acquisition is due to growing demographic pressure bringing about more competition for land use, and is characterized by: the significant number of large-scale deals; increased attention on governance issues related to the fact that many of these land deals are secret; and finally greater awareness on the potential negative social and environmental consequences of such transactions.

2.3 Drivers of the Recent Rise in Demand of Land in Africa

The strong demand, the scale and accelerated pace of land acquisitions over the past few years have been unprecedented and are raising a lot of interest from various stakeholders. Studies by Cotula et al., (2009), Daniel and Mittal (2009), De Schutter, (2009), Friis and Reenberg, (2010), Antonelli and al. (2015), Sulieman (2015), Zoomers and al, (2016), Yengoh and al. (2016) suggest that the main drivers of the demand for land are food security, , bio-fuel and energy security, carbon sinks/carbon markets, attractive agricultural investment and securing raw materials to sustain industrialization in certain countries, and speculation on land values increasing.

The increased international interest in acquisition of vast tracts of African land is driven to a large extent by other countries' and multinationals' needs to ensure security of their food requirements by means of controlling production, given risks for eventual declining global food stocks. Demographic, climatic, economic and policy changes have all had some bearing on the dwindling food stocks in the global food market.
On the other hand, governments, especially in Africa, are inviting foreign investment as well as national private sector investors to participate in agriculture development with the strategic expectation to enhance agricultural production, earn higher income, create more local jobs and improve their export base.

2.3.1 Land for Food security

Population growth and urbanization, combined with the depletion of natural resources in certain countries, has led these countries to view large-scale land acquisitions outside of their national territories as a means to achieve long-term food security. From 1987 to 2007, the world population grew by 34 percent and it is estimated that it will increase further from approximately 6.8 billion people in 2010 to 9.2 billion in 2050. FAO (2003a) has estimated that, by 2030, an additional 120 million ha of land will be needed to support growth in food production.

The 2007-2008 global food price crisis showed that markets for agricultural commodities are increasingly unstable and volatile, and therefore less reliable for net food-importing countries, particularly following the decision by a number of major food-exporting countries to ban exports or to raise export levies. As a result, resource-poor but cash-rich countries have turned to large-scale land acquisitions in order to achieve food security.

This has also led countries and private investors, including large investment funds, to acquire land for speculative motives, based on the belief that arable land prices will continue to rise in the future.

2.3.2 Land for Bio-fuel security

Concerns about global warming and climate change due to greenhouse gasses has led to growing interest in green energies including agro-fuels, thus contributing to boost the demand for agricultural land to unprecedented levels.

The establishment of targets for biofuel use in developed countries and regions and the volatile crude oil prices have created additional incentives to diversify sources that may ensure energy security. All of these factors have brought about an increase in the demand for land to cultivate agro-fuels as an alternative to fossil fuels, which is being encouraged through public tax incentives and subsidies in developed countries.

2.3.3 Land for Carbon sinks-carbon market

Carbon markets are also inspiring land acquisitions in the expectation of long term increases in land values. As part of the post Kyoto protocol arrangements, developed

countries can offset their excess emissions by storing carbon through afforestation and avoiding deforestation in developing countries.
The establishment of tree plantations to act as "carbon sinks" is being promoted in many African countries. The idea, based on storing carbon in trees, is to sell "carbon credits" to polluters that can then claim that they have reduced or even neutralized their carbon emissions by buying these credits (WRM, 2010).

The idea of storing carbon into degraded lands is also attracting interests from private sector, companies and international community with the 4 per 1000 Initiative.
The potential returns from the carbon market may increase land values.

2.3.4 Land as an Attractive Investment

While food and energy security are the key drivers of government-backed agricultural investments, the private sector's interest is based on expectations of high returns on investments. According to Smaller and Mann (2009), the international financial crisis and the collapse in housing and stock markets worldwide in 2008 created a vacuum for investors. This has led to increased interests in new investment opportunities for Foreign Direct Investment (FDI) from large international investors and banks. As a result, the interest in agricultural land as an investment target has risen, increasing the competition for land. This trend is further encouraged by the expectation that future value and power lies in the rights to land and freshwater.
Many African countries have adopted a strategy of agriculture-led industrialization that requires increasing agricultural productivity and production. Foreign investment is therefore considered to have a major role to play. In order to encourage FDI, reforms in investment codes, fiscal, land tenure and banking have been carried out in many countries to facilitate foreign investments. sectors. Land policies and generous tax incentives in African countries are therefore facilitating large-scale land acquisition as investors (foreign, domestic and nationals living abroad) cash in on the very attractive investment climate (Heong, 2011).

2.3.5 Land for the Security of raw materials

Some countries depend on importing agricultural commodities as raw materials to sustain their industrialization. Continued economic growth requires secure access to these commodities where they cannot be replaced by alternatives raw materials.
Some commodities that are subject to this kind of pressure include rubber, timber, cotton, sugar, coffee, cocoa, tea, soybeans, fish…. To secure these commodities, land has been acquired in other countries to produce and then export them to the investor's home country, especially in cases where other arrangements to secure these commodities are uncertain.

2.4 Land transactions

2.4.1 Scarcity of information

In the absence of consistent and reliable information on land acquisition, a number of stakeholders such as The International Land Coalition (ILC) and NGOs – including

GRAIN – have created a web-based depository of emerging stories on land acquisitions, with news and reports about the global rush to buy up or lease farmlands as their main sources of information.

In September 2010, the World Bank and partners released a report on global farmland acquisition after years of research. Due to the difficulties faced by the authors in obtaining information on land deals from governments providing the land and from investors acquiring the land, the report relied on data from various sources (GRAIN, 2010).

2.4.2 Size of deals

The lack of authoritative data on the trends, sizes of deals, terms of deals, etc., results in discrepancies in the published data on the issue. According to an estimate by Friis and Reenberg, (2010), as of 15 April 2010, about 177 land deals in various stages of negotiation, conclusion or implementation could be identified in 27 different countries in Africa. The area involved in these deals is estimated to vary from about 51 to 63 million hectares.

The main challenges face in documenting the number of land deals and their sizes are the following :

- A lack of transparency in figures provided by the actors ;
- The dynamic nature of the deals with possible cancellation and/or reduction or increase in size. One of the best examples is the deal between Madagascar and the South Korean investor to grow maize and biofuels. For these guidelines, estimates gathered from various sources are only provided for a situational analysis on large-scale land deals in Africa.

A total of 117 large-scale land deals equal or superior to 1 000 ha have been recorded in 21 African countries since 2000. Information on the land surface was obtained only for 73 deals, which come to a total of 21.9 million ha which is about 1.8 percent of the total agricultural area of the African continent.

2.4.3 Estimates of geographic distribution of land deals

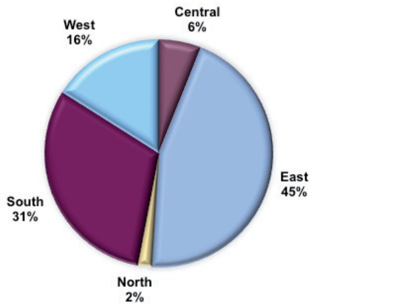

Fig 2.1: Distribution of the number of deals in Africa by the geographic regions.

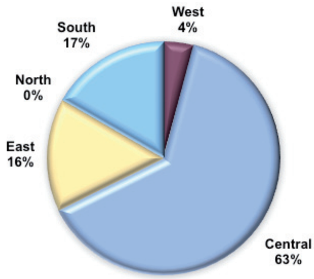

Fig 2.2: Distribution by geographic regions of the areas involved in the deals as portions of the total area of land deals in Africa.

Figure 2.1 presents the distribution of the number of deals by African geographic regions where Egypt is included in the North. The greatest number of deals (45 percent of the total) took place in East Africa, with the majority in Ethiopia accounting for about 27 percent of the total number of deals in Africa. Southern Africa is second with 31 percent. North Africa has the smallest number of deals. The distribution by geographic regions of the areas involved in the deals as portions of the total area of land deals in Africa is illustrated in Figure 2.2. The Central African region largely dominates other regions with 61 percent.

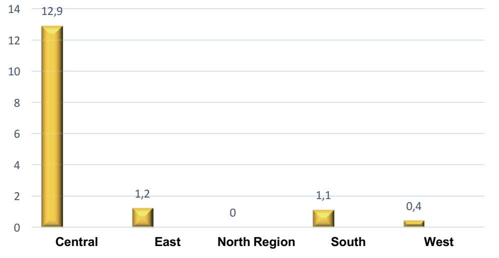

Figure 2.3: Proportion of the area of the land deal as a fraction of the agricultural area in each of the five geographic regions of the continent

Figure 2.3 shows the proportion of the area of the land deal as a fraction of the agricultural area in each of the five geographic regions of the continent. Central Africa has the highest proportion of its agricultural area (13 percent) allocated to land deals.

2.4.4 The origin of investors and their activities

The origin of the investors in land deals in Africa can be regrouped into three main categories. These are: Middle East/oil rich States (Saudi Arabia, United Arab Emirates, Qatar, Libya, Kuwait); highly populated Asian countries (Japan, India, China, South Korea); and Western/North American companies. Considering the number and area of the deals involved, two other categories of investors can be identified. These are South Africa and others (Australia, Brazil, Egypt and Djibouti).

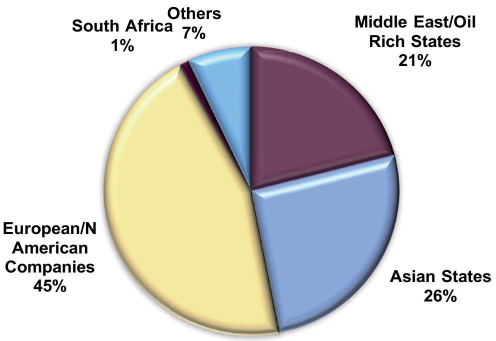

Figure 2.4: Number of deals by investors from various regions of the world as a fraction of the total number of deals in Africa

In terms of the number of deals and area involved, out of a total of 88 deals for which the identity of the investor was known, 39 were Western/North American companies accounting for 45 percent of the total number of deals as shown in Figure 2.4. The Asian countries arrive second with about 26 percent of the deals. South Africa and others account for 8 percent.

The activities the investors plan to engage in vary but may be classified into three main groups: (i) food crop production (maize, wheat, rice, cassava, sweat potatoes, soybeans, vegetables, sugar cane, sorghum); (ii) production of industrial crops for human consumption and for biofuels (tea, palm oil, jatropha, sugar cane); (iii) and preservation of forests for carbon sinks/carbon trading. Fish and livestock production are also important in some cases.

The situation above only refers to some of the recent land deals, i.e. since the year 2000. If land acquired during the colonial era is included, this can significantly affect the current situation on the ground in regard to investors and the extent of land holdings. After independence, some of the colonial holdings became the property of multinational corporations and some were nationalized. This would call for an assessment on the status of land acquired during the colonial era.

2.4.5 Impacts of land deals

Some of the intended aims of large-scale land acquisitions are to; modernize agriculture, enhance food security, create jobs and promote socio-economic development. These deals are sometimes considered to take place on marginal lands and are sold or leased as win-win arrangements for the host countries and the investors. However, up-to-date experience calls for an urgent assessment of these deals in terms of their promises of sustainability and socio-economic benefits.

A study by the Oakland Institute (2011) concludes that most large-scale land deals in Africa do not encompass marginal or infertile land, contrary to what is often claimed. Instead, these deals have incorporated fertile land near to water resources to allow access to irrigation and close to infrastructure such as roads, railways and ports to have good access to both national and international markets. Many deals also provide control not only over land but also water and usually for free. In addition, farmers are forcibly removed from their ancestral lands with little or no compensation and subsequently lose their livelihoods (Yengoh and al., 2016).

As far as employment is concerned, in most cases very few jobs have been created compared to the number of persons who may have lost their land and cannot farm to feed themselves.

Cotula et al., (2009) found out that, even though some countries have progressive laws and procedures that seek to promote the local population's involvement, large gaps exist between theory and practice, resulting in major costs being internalized by local people. In addition, many countries do not have mechanisms in place that protect the population's rights and take into account their interests, livelihoods and welfare (Bartels, 2014).

In many countries, poor land governance, the lack of transparency and the exclusion of the local population in the decision-making process invariably leads to help undermine the position of these stakeholders. Investors, government officials and the local elites in general are those who seem to gain the most from these land deals. Very few positive impacts have been documented on the livelihoods of the local communities who lost their land (Sulieman, 2016, Vandergeten, 2016, Yengoh, 2016) .

2.5 Some Key Issues Relating to Land Deals

Key points

(i) There is growing interest in purchasing or long-term leasing of large portions of land, mostly from developing countries and particularly in sub-Saharan Africa for food security and speculation that land values will continue to increase, bio-fuel and energy security, carbon sinks/carbon markets, attractive agricultural investment and securing raw materials to sustain industrialization in certain countries.

(ii) Many of the deals have been concluded in countries with weak land tenure governance and where land legislation is complex, inconsistent or obsolete. Hence very low price, environmental costs rarely are taken into account and the rights of the local communities often ignored.

(iii) There are a number of grey areas which still have to be clarified: type of contracts, duration of land leases (vary from 25 to 99 years), what is or should be the interest of the host countries or the communities in these deals; what is the impact of these deals on food sovereignty; would food crops be used for local consumption or exported in times of famine in the investors' country; is there enough productive land for crop production and planting of crops to be used in the production of agro-fuels?

CHAPTER 3

INCORPORATING SOILS PRODUCTIVE CAPACITY IN THE ECONOMIC VALUATION OF LAND

CHAPTER 3 - INCORPORATING SOILS PRODUCTIVE CAPACITY IN THE ECONOMIC VALUATION OF LAND

3.1 Current inadequacy of land valuation

Most land deals in Africa involve leases for which rent amount should be determine . the rents or the amount charged in selling transactions are very low. This is attributed firstly to inadequately appraising the land's value and secondly to disregarding the land and soils' productive capacity in the analysis.

The land's production potential, use options or opportunity costs coupled with demand/ supply and the perception of the land's future benefits are the main factors that affect land prices in a functional land market (FAO, 2003b). For example, rising world market food prices stimulate demand for land and this influences the land's value. Inadequate appraisal stems from discounting these aspects.

This chapter seeks to provide a framework that can be used to adequately appraise the land in monetary terms based on economic principles that include the land's productive capacity and the best land use options.

3.2 The Value and Price of Land

Before we examine these factors, let us clarify the definition of the technical terms used when discussing land valuation.

3.2.1 Terminology

According to FAO (2003b), the land value designates the actual worth of the land in relation to other similar properties. Two types of value can be distinguished. The natural value of land is the land's productive capacity, which depends on its physical land attributes. The economic value of land is related to expected benefits, which are not necessarily linked to its present use and production potential. Value cannot always be expressed in economic terms. Some lands are very valuable because of their religious, cultural, or educational uses.

Price of land is used to express the land value in monetary terms and is the generally accepted means for comparing land values in a market (FAO, 2003b). The price of land refers to what the land might be sold for at a specific time.

The land rental value is the price paid annually for the exclusive right to a piece of land and may include a speculative opportunity cost (Gwartney, 2009). Given that land has a fixed supply, as the demand for land increases, the rental value increases proportionally.

LexisNexis, (2011) defines capitalization as the process of discounting anticipated future profits to present market value by the use of appropriate capitalization rates. The capitalization rate can be viewed as a market determined rate of return that would attract individuals to invest in the use of land while considering all risks and benefits.

The land market value is the price at which a willing seller would sell and a willing buyer would buy, neither being under unreasonable pressure (LexisNexis, 2011). The land market value can be defined as:

= (Land rental value - land taxes) / capitalization rate

If only a small amount of land rent remains to be capitalized after land taxes are collected, land could have a lower market value. It would, however, continue to have the same rental or productive value to the community.

3.2.2 Factors affecting the value and price of land

In production economics, land is considered one of the three factors of production (along with capital and labour). In most large-scale land deals in Africa, the land is leased rather than sold meaning that rents on the land should be paid. The land's economic value is determined by many variables that are dynamic and site specific. FAO (2003b) indicates that the value of agricultural land is affected by the following factors:

- Physical attributes: These include the quality of the location and the land's productive capability. Deep, fertile, better structured well-drained clay loam soils in an area with a suitable climate will generally result in good crop yields. However, paddy rice will do well in poorly drained soils while groundnuts will do well in well-drained sandy soils. Hence, the land's productive capacity has to be assessed in relation to a crop that most benefits from the particular soil and water qualities. The value of the location relates to aspects such as road infrastructure, access and distance from markets, access to schools for employees, amenities, etc. Land closer to markets will have lower transportation costs and hence lower production costs leading to higher value for the land.

- Land tenure security: people will only make improvements if they are guaranteed long-term use of the land and stable rent costs. Land tenure security therefore contributes in increasing the land value.

- Agricultural policy: Government policies significantly influence crop prices, which in turn affect land prices or values. World market prices and the degree to which governments align their consumer prices to these affect agriculture profitability. Price setting mechanisms at national level include, inter alia, taxation and price support in favour of farmers. Keeping food prices low to protect the consumer market will affect supply and demand, profitability and therefore the land value.

- The higher the crop prices, the greater the land value because demand for land will increase due to more investors finding agriculture a profitable venture.

- Land use options: Land in peri-urban areas has many more land use options. The land could be used for agriculture but could easily be used for housing estates, industry building complexes, etc. In addition, many different types of crops could be grown in such locations, especially high value crops such as vegetables which are perishable and need to be grown closer to market centres.

- Land use policy/zoning: zoning removes the speculative element of potential future land use changes and thus often has a stabilizing effect on land prices. Zoning for rural land use planning can separate areas with similar sets of potentials and constraints for specific uses. Agricultural land next to a forest reserve/wildlife sanctuary land reserve may have a lower value due to potential crop damage by wild animals.
- Speculation: recent increases in world food prices coupled with the promotion of biofuels have resulted in investors rushing and investing in agriculture both because it is profitable and to ensure food and energy security. It is, however, felt that some of the investors may not actually use the land. They simply secure land for possible re-sale or re-hire as they anticipate rising demand and prices of agricultural land. They believe that the demand for agricultural land is increasing and therefore its value should do so in the future. The price paid for land is also time dependent and largely driven by how present or future benefits to be derived from it are perceived at the moment of the deal. These are influenced by socio-economic, legal and political decisions.

The valuation of land is complex because a given piece of land can have different uses and hence different values. In addition, the initial use can change, e.g. converting agricultural land to urban use or to mining if the area is discovered to be rich in minerals.

3.3 Land Rent Value Appraisal

Land rent value appraisal or estimation is an expert opinion of the market value of a land site (Havard, 2004). According to RE Financial Solutions (2008), two methods can be used to calculate the value of land. These are the comparison method and the land residual method.

3.3.1 The comparison method

This method starts by analysing prices obtained in the market for sales of sites with similar characteristics. The valuer then determines a value for a particular site by making adjustments to prices of similar properties. The adjustments are based on the judgment of the valuer, his or her knowledge of the market and the specificities of the particular site. This appraisal technique depends on the use of truly comparable market or sales data that have occurred recently enough to reflect market conditions relative to the time period of the appraisal.

The method is commonly used in real estate development and could also be used for the valuation of agricultural land. However, this method is only appropriate where there is sufficient evidence of sales with similar characteristics.

The comparison method is a rule of thumb used by valuers to estimate the likely market value of a site. Because it is based mainly on the comparative evidence of the highest price necessary to acquire a site, it provides an objective value indicator, thus identifying what the price would be if the site were put on the market immediately. It therefore takes into account the numerous valuation factors that buyers consider when reaching an offer price.

Rental value/ha = net annual income per ha
= (Total income of highest and best use - total production costs) per ha
Land value per ha = rental value per ha / capitalization rate

3.3.2 The land residual method

When few sales have occurred and the data is not really available, such as for large-scale land deals, the land residual method should be used. This approach is based on the assumption that the land is improved to its highest and best use. Highest and best use is an appraisal phrase referring to the use of land that is most likely to produce the greatest percentage net return on the land. All operating expenses and the return attributable to other agents of production are deducted. The net income imputed to the land is capitalized to derive a land value estimate. The land residual method indicates the value to the prospective purchaser.

(i) Determining the highest and best use of land area

The highest and best use considers only the uses that are:

- Legally permissible (meeting zoning, health, and public restrictions),
- Physically possible (has adequate size, soil conditions, and accessibility), and
- Economically feasible (income is anticipated).

The use that meets these criteria and produces the greatest net earnings (best returns) is the highest and best use.

Land deals chiefly involve agricultural production; other uses such as developing housing estates or industries are not envisaged. The best use of the land is therefore directly linked to crop production with the highest benefits. This is the recommended approach when carrying out the valuation rather than considering the crop the investor plans to grow because this may change. For large land areas, a number of crops could be selected based on the land suitability.

(ii) Estimation of the value using the current appraisal theory

Two types of analyses should be carried out to determine the highest and best use of the land by examining two different options: keeping the land as is (undeveloped) which includes: a reserve attracting tourists, land that provides wild food and medicinal plants, a carbon sink/sequestration, watershed conservation or transforming the land into an agricultural area (developed).

Depending on the specific situation, one option may yield greater net returns than the other. The land rental value per ha and the value of the land can be calculated from the total income, which should be based on long-term average yields, and the long-term price of the highest and best use. Production costs include: seed, fertilizer, chemicals, machinery repairs, taxes, depreciation on buildings and machinery, interest on buildings and machinery, fuel, insurance, labour and return on investments but should not include leasing or rental costs.

In parts of Canada, the minimum capitalization rate is the earnings on a savings account while the maximum rate is the bank interest on loans (Government of Saskatchewan, 2008). In Texas in the United States, the property tax code requires that, for agricultural or open-space land, the capitalization rate should be greater than 10 percent or the interest rate specified on the previous 31 December by the Farm Credit Bank of Texas plus 2.5 percent if this is greater (Texas State Government, 2011). Over the past 20 years, the capitalization rate in Texas has ranged from a low of 10 percent to a high of 12 percent.

Small variations in crop yields and prices can have a dramatic effect on land returns. Furthermore, prices cannot be predicted accurately and yields can vary significantly in the short run. Sensitivity analysis should therefore be carried out using different yield and price assumptions. The range of results provides a basis for assessing the risk involved in buying or leasing land.

The land residual method can be used to value the land when market or sales data are unavailable and is appealing to use for land deals in most African countries, given that there are no formal markets for agricultural land and, hence, very little or no data of sales.

In summary, applying this method requires information on the best use of the land site, development costs, production costs, the hypothetical future net income and a realistic capitalization rate for the best land use.

Box 3.1 shows the steps used in valuating land in Ethiopia based on the land residual method. This valuation led to the government renegotiating some land deals to get a better share of the market rent of the land.

Text-box 3.1: Land residual technique used in Ethiopia

a) Hypothetically consider whether to develop an optimum irrigated farm on the land parcel or not (i.e., highest and best use in all respects or «ideal» improvement);

b) Estimate the net operating income from the improved land, using market prices and expenses;

c) Calculate the amount of income required to pay a proper return on the other production agents at market sale prices;

d) Allocate remaining income (residual) to the land;

e) Capitalize residual income into land value using a market-derived land capitalization rate.

3.4 Land Rent and Sustainable Environmental Management

Gwartney, (1999), discusses the effect of land market rent on the environment's sustainable management. He argues that local communities or governments are responsible for insuring that the land market rent is collected for the use of the general good. When a major part of land rent is not collected, which is the case in most of the world today, land title holders benefit a lot from the property's increased value which results from improvements made by the whole community.
As the community contributes to adding market value to the land, it should receive a fair share of this market value.

Investors pay very low-value rents for land deals in Africa. This implies that only a small proportion of the market value is taken into account and therefore results in much higher capitalization rates. This largely explains the rush to close land deals in this part of the world.

Low land rents connote unbalanced high capitalization or excessive expenditures due to inefficiency and/or wastage. It should be remembered that part of the land rent is to be used to compensate the community.

3.5 Incorporation of Land Quality Parameters in the Valuation

3.5.1 Land Residual Method

The land residual technique is one of the approaches that can be used. Its advantage lies in the fact that it does not require land market or sales data to come up with an estimate. As there are many possible options for land use, the method uses the highest/best use approach. The land productive capacity has two key elements that need to be classified: the type of land for each site and determining what crops with the highest return may be grown.

Both the economic and land productive capacity parameters are to be taken into account. This comprises the market price of the foreseen crop, which may not be considered in the traditional land valuation method and also includes geographic location aspects in production costs such as transport costs to the market. Data on production costs, market prices for the products, and the capitalization rate are required.

Agro-climatic suitability classes should be also determined for specific crops and used to estimate yields. The minimum data required to determine expected yields for a given crop include:

- Soil quality
- Landscape
- Climate – adequate temperature and water availability

Good quality soil on gentle uniform slopes with a good climate will likely produce good yields without heavily relying on irrigation or expensive land levelling. Such soils will therefore be classified as most favourable. Production costs will be lower and result in higher residual for the land and hence higher market value or rent. If irrigation water is not readily available at the land site and yet required, it will have to be brought to the area. This increases production costs and hence reduces land value. If the water quality is poor, this may restrict its use and exclude some crops with high returns.

3.5.2 Determining the productive capacity of the land

In rural areas, agriculture is the dominant land use, and the land's suitability to produce good crop yields is the primary asset for expected land earnings and, subsequently, for its market value. Different methods exist for evaluating the land use potential for arable, cropping, grazing, forestry and other land use types.

FAO (1996) proposed a semi-quantitative crop-specific method for land evaluation. Land attributes are matched against crops' natural growth requirements in terms of agro-climatic, soil chemical and physical needs, and soil workability/ease of management.

When these attributes correspond to optimal growth conditions, the land is considered highly suitable, and a maximal yield can be expected, ranking that land in the highest value class. The more its properties deviate from the optimal growth requirements, the less suitable the land is and the lower the production and expected yield. Alternatively, depending on the type and degree of the constraints, the land can be reclaimed (at extra costs and, thus, at lower benefits) in order to achieve the expected yields. Semi-quantitative or quantitative rating scales can be developed and can subsequently be converted into land productivity levels.

Land capability and carrying capacity for extensive grazing depend less on intrinsic soil factors and more on moisture status, as expressed by rainfall amount and distribution, in combination with soil depth, drainage and soil water retention capacity (FAO, 2003b). Vegetation is particularly important as both its quality and quantity determine biomass uptake and potential carrying capacity.

In southern Africa the pasture quality is normally assessed according to species composition, the vigour of palatable species, basal cover and surface condition; and these are highly dependent on climate.

In the semi-arid areas of Namibia and South Africa, additional local factors also influence the value and price of grazing land and include: depth and quality of the groundwater table; the presence of poisonous plants during some part of the year; and bush encroachment.

Once the best use is established, the suitability class of the specified crop is used to estimate the land's expected yield, the higher the suitability class, the greater the expected yields and hence the greater the farm income. This should translate to a higher land value. The agro-suitability class of a specified crop can be related to its maximum potential yield. Table 3.1 is a proposed guideline based on FAO's (1996) recommendations. The soil scientist on the negotiating team for the land deal should be responsible for developing the suitability classes.

Table 3.1: Proposed guidelines for attainable yield of crops as a fraction of the potential maximum yield for different suitability classes

Agro-climatic suitability classification	Attainable yield as a percentage of potential maximum yield
S1: Very suitable	80-100
S2: Suitable	60-80
S3: Moderately suitable	40-60
S4: Marginally suitable	20-40
Vms: Very marginally suitable	5-20
N: Not suitable	0-5

For major crops, existing quantitative models should be used to estimate potential maximum crop yields under different agro-climatic conditions.

Text-box 3.2: Case study

Sisay, (2010) reported that the Ethiopian government had come to realize it was not getting a good rental value in land deals. Based on a better land valuation, the following proposals were made in 2010 and submitted for government approval:

- New rental values should take into consideration the distance of the farm to Djibouti port, Port Sudan and the central market in Addis Ababa. If a farm is located 700 km away from Addis Ababa, the investor is expected to pay 111 birr[1] (USD 6.2) / ha/ year for rain-fed agriculture. As the area gets nearer to the central market in Addis Ababa, the rental value increases by 4.05 birr (USD 0.23) per km, and drops by the same amount per km for lands greater than 700 km from Addis Ababa.
- For irrigation farming, the rental value should be 158 birr (USD 8.83) per ha/year and increases or drops per km by 4.17 birr (USD 0.23), depending on the distance from the central market in Addis as above. Rental values are subject to revision every 10 years.
- Lease durations should be 25 years for annual crops and 45 years for perennial crops.
- At the moment, investors do not pay for water but the government plans to introduce water fees because some local residents are suffering from water shortages due to agricultural investments, especially when investors bring many daily-labourers to their farms from other parts of the country.

Key points

(i) Low land rates can be attributed to inadequate or disregard of land productive capacity in analysis.

(ii) A framework to adequately appraise land in monetary terms that include the land productive capacity is necessary

(iii) Two methods for land valuation taking into account soil and land productive capacities have been proposed: a Comparison method and a Land Residual Method

1 17.9 birr = 1 USD on July 21, 2012

CHAPTER 4

KEY ENVIRONMENTAL PARAMETERS FOR LAND VALUATION

CHAPTER 4 - KEY ENVIRONMENTAL PARAMETERS FOR LAND VALUATION

The approach to incorporate environmental considerations into land valuation, discussed in Chapter 3, first requires to determine the land's productive capacity. This in turn entails establishing agro-climatic suitability classes for each crop. These classes are then used to estimate the yield based on knowledge of the maximum potential yield. As explained earlier, the land data required to determine expected yields for a given crop are the following:

- Soil quality - the soil's agricultural performance capacity
- Climate – adequate temperature and availability of water
- Topography and the quality of the location

This section therefore, focuses on the key land parameters required to describe the agro-climatic suitability of the land based on the three criteria here above. Subsequently a minimum data set that may be used in major farm systems will be discussed.

4.1. Soil Quality

Soil quality is defined by the Soil Science Society of America as "the fitness of a specific kind of soil to function within its capacity and within natural or managed ecosystem boundaries to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation". Soil quality assessments often use a small group of indicators (i.e. a minimum data set) to economically and efficiently characterize selected key soil functions.

The minimum data set for soil quality assessment should be designed to establish a reliable estimate of the soil's capacity to perform a defined set of functions. Because of the competing uses and inherent limitations regarding different soils, the components of a minimum data set cannot be considered universal. The selection of soil quality indicators should be based on the key soil functions that respond to the primary management goals. For land valuation, the key function is developing suitability classes based on the soil's productivity capacity.

There are three types of soil quality: chemical, physical and biological.

4.1.1. Chemical quality

(a) Organic matter

Organic matter influences the soil in terms of colour, physical properties, supply of available nutrients and adsorptive capacity. Soils with low organic matter have poor chemical, physical and hydrological properties. Poor plant nutrient release is attributed to low soil organic matter content as well as low water holding capacity and high erosion risk. Different farming practices directly affect soil organic carbon stocks and flows, especially those related to soil and land management. Agricultural soil quality and ecological functions primarily depend on the soil's organic matter content and quality. In general, soil organic matter fosters a range of soil organisms and soil biodiversity.

Soil organic matter consists of a variety of components. According to FAO (1997), organic carbon can be grouped into 5 classes (Table 4.1). Organic matter in soil serves as a revolving nutrient bank account, an agent to improve soil structure, maintain tilth, and minimize erosion.

Table 4.1. Broad rating of organic matter and cation exchange capacity

Class	Organic Carbon (%)	Cation Exchange Capacity meq/100 g soil	Cation Exchange Capacity meq/100g Clay
Very low	0-0.6	0-2	0-1.5
Low	0.6-2	2-10	1.5-6.0
Medium	2-3	10-30	6.0-16
High	3-8	30-60	16-36
Very high	8^+	60^+	36^+

Source: Landon, (1991); FAO, (2006)

Total organic carbon (TOC) is the carbon (C) stored in soil organic matter (SOM). Organic carbon (OC) enters the soil through plant and animal residues decomposition, root exudates, living and dead microorganisms, and soil biota. SOM is the organic fraction of soil exclusive of non-decomposed plant and animal residues. SOM is a heterogeneous, dynamic substance that varies in particle size, carbon content, decomposition rate, and turnover time (Edwards et al., 1999; Sikora and Stott, 1996).

In addition to plant tissue, the micro flora – bacteria, fungi, algae and actinomycetes –, micro fauna – protozoa and nematods – and macro fauna – earthworms, ants etc. – play an important role in the formation of organic matter.

(b) Soil fertility

Soil fertility refers to the amount of nutrients in the soil. A fertile soil should contain the essential elements presented in Table 4.2. These can be grouped into macro and micronutrients. The macronutrients can be further categorized as primary, secondary and non-mineral. A mineral element is essential when it is required for normal plant growth and reproduction.

The amount of each element required by the plant varies. However, all essential elements are equally important in terms of plant physiological processes and plant growth. Sodium (Na), silicon (Si), and vanadium (V) are sometimes listed as essential elements. Non-mineral essential elements are derived from the air and water. Although micronutrients are required by plants in very small quantities, they are equally essential to plant growth.

Table 4.2: Essential elements, and sources from where they are obtained by plants

Category of Nutrients	Sub-category	Elements	Source obtained by plants
Macronutrients	Primary	Nitrogen Phosphorous Potassium	Mostly from soil
	Secondary	Calcium Magnesium Sulphur	Mostly from soil
	Non-mineral	Carbon Hydrogen Oxygen	Mostly from air and water
Micronutrients	Not applicable	Iron Manganese Boron Zinc Copper Molybdenum Chlorine Cobalt Nickel	Mostly from soil

Nitrogen

Nitrogen is one of the 16 elements necessary for plant growth and production. The plant absorbs nitrogen from the soil or through foliage. Nitrogen deficiency can be identified when a plant's lower leaves turn yellow. Too much watering or rainfall can leach nitrogen from the soil, and excess nitrogen results in excessive growth, dark green leaves, weak and spindly stems, and low or no fruit production.

Nitrogen measurements in the soil are difficult to interpret since the types present and their relevance to crop nutrition are not well known (Landon, 1991; Brady and Weil, 2002; Halvin et al., 2005).

However, in certain environments, general agreement exists and therefore, the ratings in Table 4.3 are presented as a very general assessment of total N contents. Nitrogen is subject to more transformations than any other essential element. These cumulative gains, losses, and changes are collectively termed the nitrogen cycle. Nitrogen fixation is the process whereby inert N2 gas in the atmosphere is transformed into forms that are plant-available, including NH4+ or NO3- (Table 4.4).

Table 4.3. Broad ratings of nitrogen measurements

N content Kejeldahl Method (% of soil by weight)	Rating
>1.0	Very high
0.5-1.0	High
0.2-0.5	Medium
0.1-0.2	Low
<0.1	Very low

Source: FAO, (1997); FAO, (2006)

Table 4.4. Rating of soils by their nitrate-nitrogen contents

Soil test rating	Nitrate –Nitrogen (N- NO_3^-) (ppm)
Very low	0-3
Low	4-10
Medium	11-20
High	21-40
Very high	>41

Source: Landon, (1991); FAO, (1997)

Phosphorus

Soil phosphorus (P) originates primarily from the weathering of soil minerals and from additions in the form of fertilizers, plant residues, agricultural wastes, or biosolids. The type of phosphorus-bearing minerals that form in soil is highly dependent on the soil's pH. Soluble phosphorus, regardless of the source, reacts very strongly with iron (Fe) and aluminium (Al) to form insoluble Fe and Al phosphates in acid soils and with calcium (Ca) to form insoluble calcium phosphates in alkaline soils (Landon, 1991; Brady and Weil, 2002; Halvin et al., 2005). Although most agricultural soils are naturally low in available phosphorus, many years of intensive phosphorus fertilization and/or the application of organic phosphorus sources have resulted in many soils testing high in available phosphorus (Halvin et al., 2005). Release of available phosphorus depends on the soil type and soil reaction. Several investigators have established broad criteria for phosphorus availability to plants, and one of them is indicated in Table 4.5.

Table 4.5. Soil available phosphorus to plants

Available P by resin extraction (ppm)	Available P status	Yield increases expected with adequate phosphate fertilizer
< 3	Actually deficient	Very large
3-6.5	Deficient	Large
6.5-13	Marginal	Small
13-22	Adequate	Non-appreciable
>22	Rich	No response

Source: Landon, (1991); FAO, (1997)

Phosphorus movement in soil varies depending on the soil type, although it generally stays very close to where it is placed. With the exception of deep sandy soils in high rainfall areas, very little phosphorus is lost to leaching. Tests on loamy and clay soils with a history of phosphorus fertiliser application show a rapid reduction in phosphorus with depth. Phosphorus oxidizes into phosphates, which can be carried away by runoff from agricultural soils. The breakdown of organic pesticides that contain phosphates also leads to their release into the environment.

Potassium

Potassium (K) is the third primary plant nutrient and is absorbed by plants in larger amounts than any other nutrient except nitrogen (N). Plants take up potassium as the monovalent cation K^+. Plant roots can easily take up the released K^+, absorbed by the cation exchange complex of clay and organic matter, or "fixed" in the internal structure of certain 2:1 clay minerals. Plant-available potassium accounts for 90 to 98 percent of the total soil potassium. Readily and slowly available potassium represents only one to ten percent of the total soil potassium (Landon, 1991). Plant available potassium readily absorbed by plant roots includes the portion of the soil potassium that is soluble in the soil solution and exchangeable potassium held on the exchange complex. Potassium fertilizers are completely water-soluble and have a high salt index; thus, they can decrease seed germination and plant survival when placed too close to seed or transplants. Potassium can be rated in relation to CEC (Table 4.6).

Table 4.6. Rating of soils by their potassium percentage of the exchangeable cations vs. the total CEC

Soil test rating	Potassium (% of C.E.C.)
Very low	<0.75
Low	0.75 - 1.5
Medium	1.5 - 3
High	3 - 5
Very high	>5

Source: Landon (1991)

Cation Exchange Capacity (CEC)

The CEC is an inherent characteristic of the soil, which means it is not easily affected by management. It is strongly affected by the soil texture and the type of minerals. In sandy soils however, the CEC can be increased by management practices, which increase the organic matter. The CEC affects the way a soil should be managed for crop production and environmental protection. Soils with CEC greater than 20 may have high clay content, moderate to high organic matter content, high water holding capacity, less frequent need for lime and fertilizers (except N), and low leaching potential for some nutrients. Cation exchange capacity measurements are used for overall assessment of the soil's potential fertility and possible response to fertilizer (Landon, 1991). In general, smaller amounts of fertilizer, applied more often, are needed in low CEC soils to prevent leaching losses, while larger amounts may be applied less frequently in high CEC soils. CEC values in the topsoil are presented in Table 4.7.

Table 4.7 Ratings of CEC results for top soils

CEC, (meq/100 g of soil)	Rating
>40	Very high
25-40	High
15-25	Medium
5-15	Low
<5	Very low

Source: FAO, (2006)

(c) Soil pH (acidity and alkalinity)

The pH is a measure of the concentration of hydrogen ions in the soil solution. Soil acidity is among the important environmental factors that can influence plant growth and can seriously limit crop production. Acidic soils can restrict microbial activity, reduce the availability of essential nutrients and cause aluminium toxicity, which slows down root growth (Stockdale, 2011). An acidic soil is defined as any soil that has a pH of less than 7.0 (neutral). For most agronomic crops, a soil pH between 6.0 -7.0 is ideal for crop growth. However, the pH tolerance range can vary from one crop to another.

(d) Electrical conductivity in the top soil- soil salinity and sodicity

The concentration of soluble salts in the soil solution is measured by the electrical conductivity (EC) of the saturation extract. The EC is commonly used to measure salinity. Sodicity (sodium rich) and salinity are soil characteristics responsible for soil degradation and affect agricultural production in several ways. The adverse effects of soil salinity on plant growth vary with the type of crop grown. There is an approximate tenfold range in salt tolerance for agricultural crops.

This wide choice of crops greatly expands the usable range of saline water for irrigation and emphasizes the fact that water quality and soil salinity are specific for each intended use. Salt damage is aggravated by hot, dry conditions and may be less severe in cool humid conditions. The evaluation of plant salt-tolerance data by Maas and Hoffman (1977) concluded that, for each crop, a certain threshold value exists beyond which crop yields decrease linearly with increasing salinity. When the soil saturation extract EC value is less than some prescribed threshold value, crop yields are unaffected and represent 100 percent relative yield. Soils are classified as saline if the electrical conductivity of the saturated extract exceeds 4 decisiemens per meter (dS/metre).

Sodium is a dispersant and provokes the breakdown of soil structure. Rengasamy and

Churchman (1999) summarized the physical manifestations of soil sodicity as crusting, hard-setting and soil water logging; the range of side effects in terms of water movement into the soil profile included reduced infiltration and plant-available water capacity. Reduced leaching results in perched water tables, and accumulation of toxic elements as well as increased fuel consumption during tillage, with implications for increased management costs.

4.1.2. Physical quality

Soil texture is an important physical soil characteristic that shapes crop production and land management. The proportions of sand, silt, and clay in a soil determine its textural classification. The following soil properties are influenced by the soil texture: drainage, water holding capacity, aeration, susceptibility to erosion, organic matter content, cation exchange capacity (CEC), pH buffering capacity and the soil tilth.
Effective soil depth is the depth of the soil before which normal crop root growth is limited and affected by the presence of a hardpan, compacted layers, rocks, gravel layers or high water tables. Table 4.8 presents broad soil depth classes.

Table 4.8. Broad soil depth class

Soil depth (cm)	Class
<25	Very shallow
25-50	Shallow
50-100	Moderately deep
100-150	Deep
150-180	Very Deep
>180	Extremely deep

Source: Landon, (1991), WSRR, (2006)

4.1.3. Biological quality

Biological indicators include measurements of micro and macro-organisms and their activities or functions. Anderson (2003) gives the following as indicators for use in biological soil quality: concentration or population of earthworms, nematodes, termites, ants, as well as microbial biomass, fungi, actinomycetes, or lichens because of their role in soil development and conservation; nutrient cycling and specific soil fertility. Microbial biomass is an indicator commonly used to measure the biological quality of soil. The number of microorganisms in the soil is proportional to organic matter concentrations in the upper 30 cm (Schnitzer, 1991), hence the higher the organic matter content, the higher the microbial biomass.

4.2 Climate and Irrigation Water

4.2.1 Climate

The major climatic factor which influences crop growth is rainfall. In areas with little rainfall natural vegetation is limited, while in areas with high annual rainfall, dense forests are found. Based on the annual rainfall, a distinction can be made between six major climatic zones as shown in Table 4.9.

The wet period refers to the period during which rainfall is higher than evapotranspiration. In desert and arid areas, irrigation or water harvesting or water conservation is essential for crop growth. Some drought resistant crops may give reasonable yields in these areas, but there is a risk of unreliable rainfall and subsequent crop failure. In sub-humid and moist sub-humid areas, irrigation is required only during the dry season. Crop growth depends not only on rainfall, but also on other climatic factors (most notably sunshine and temperature).

Table 4.9 Major climatic zones in Africa (based on annual rainfall)

Climatic Zone	Annual Rainfall, (mm)	Wet period (months)	Vegetation
Desert	< 100	0-1	Little or no vegetation
Arid	100-400	1-3	Some shrubs, some grassland
Semi-arid	400-600	3-4	Shrubs and bushes, grassland
Sub - humid	600-1200	4-6	Bushes to woodland, grassland
Moist sub-humid	1200-1500	6-9	Forest and woodland
Humid	> 1500	9-12	Tropical rain forest

Source: FAO, (1986)

4.2.2 Irrigation water

When rainfall in an area is too low to meet water requirements for agriculture, irrigation is technically the most effective soil-water management technique to maximize productivity. In these situations, the irrigation water's quality should be monitored. In general, physical impurities such as sediments and silt in suspension found in irrigation water are not harmful to crops; they may even contain nutrients that can improve soil fertility. However, high levels of physical impurities can be problematic as they can clog gated pipes, sprinkler heads and drip emitters. These impurities can also damage pumps and cause excessive wear in pressurized conduits. More commonly, sediments tend to fill canals causing expensive dredging and maintenance problems.

Chemical impurities present in water above certain concentrations are harmful to plants. The main types of salts found in irrigation water are chlorides, sulphates and sodium and any of these may be harmful to plants when too highly concentrated. The quantity of salts in the water restricts its potential uses. Using poor quality water for irrigation may result in four types of issues (Ayers and Tanji, 1981):

(a) Salinity: salt build-up in the root zone to such a level that plants cannot absorb sufficient water from the soil.

(b) Infiltration: high sodium in water reduces the rate at which irrigation water enters the soil. Hence, in extreme cases, during each watering, the water cannot infiltrate the soil and remains too low to supply the crop with its water requirements.

(c) Specific ion toxicity: certain ions (sodium, chloride, boron) from soil or water, can accumulate in concentrations that will cause crop damage or reduced yield.

(d) Miscellaneous:

- Excessive nutrients like nitrogen in water can cause excessive vegetative growth, lodging, and delayed maturity.
- Sprinkling water containing high levels of bicarbonate or gypsum or iron on leaves or fruits results in unsightly deposits.
- Increased corrosion due to chemicals in water.

Salinity is usually the most serious problem that results from using poor quality water for irrigation and is responsible for the environmental degradation of many irrigation systems around the world. Therefore, the focus will lie on issuing recommendations linked to salinity in these guidelines. The quantity of salts in the water can be determined using one of two methods: Total dissolved salts (TDS) or electrical conductivity (EC). The higher the salt content, the higher the EC and TDS values. Table 4.10 gives guidelines on what levels of salinity are to be avoided. It should be noted that the water user may alter the degree of restriction from one category to another through her/his management skills.

Table 4.10: Guidelines for irrigation water quality in terms of salinity

Measure of Salinity	Degree of restriction on water use		
	None	Slight to moderate	Severe
EC (dS/m)	< 0.7	0.7 - 3.0	> 3.0
TDS (mg/l)	< 450	450 - 2000	> 2000

Spate irrigation and run-off-river gravity irrigation regulated by diversion structures without storage may result in a very variable water supply. In water-limited months, the irrigable area is constrained by existing water supplies, not land area. An important part of any evaluation of water supply and water requirements where water is a scarce commodity and seasonally variable, is to match the water supply and water requirement (demand) profiles as closely as possible. Year to year variations in water supplies are often as important in land evaluation as seasonal variations.

4.3 Topography and Quality of the Location

4.3.1 Topography

Topography refers to the land surface's configuration, as described by four attributes:

- The major land forms which refer to the morphology of the whole landscape
- The position of the site within the landscape
- The slope form
- The slope angle

The evaluation will include the following limiting factors to rate the topography:

- Earth-moving requirements
- Field size, shape, and length of irrigation run
- Water distribution, slope, and erosion control
- Stoniness and brush or tree cover
- Surface drainage

The site's location within the land position affects its hydrological conditions (external and internal drainage such as subsurface runoff of the watershed). The major division classes of topography are presented in Tables 4.11, 4.12 and 4.13.

Table 4.11. Major land forms

Land form	Slope (Percent)
Flat	0-3
Gentle slopping plain	3-8
Undulating plain	8-15
Rolling plain Flat plains with hills Undulating plains with hills Rolling plain with hills Hilly	(dominant)15-30
Mountains	(dominant) 30
Ridge Valley River gorge	(dominant) >30%

Source: Landon, (1991)

Table 4.12. Slope description

Slope classes	Percent
Flat	0-3
Gently slopping	3-8
Slopping	8-15
Moderately steep	15-30
Steep	30-50
Very steep	>50

Source: Landon, (1991)

Table 4.13 Relative relief

Valley Depth (m)	Level	Description
<10	Very low	Deposit relief
10-30	Low	Plain of relief
30-100	Moderate	Moderate
100-300	High (deep)	Hills
>300	Very high (deep)	Very high (mountain)

Source: Landon, (1991)

4.3.2. Quality of the location

The land's location affects how it may be managed in a number of ways.

Proximity to markets or processing facilities:
Fresh vegetables and fruits are often produced on land close to highly populated centres. The presence of processing facilities, e.g. a rice mill, a sugarcane factory or cotton ginning facilities influences both transportation costs and the feasibility of growing a given crop in a particular location. Time, distance or transportation costs can be used to define critical limits. If the land use depends on inputs such as fertilizers, pesticides, seeds and planting materials, they must be available at the time and in the amounts required. When they are not, the land must be classed as 'Not Suitable' for this use. The reliability of input supply and its timeliness may be a descriptor of a land utilization type, or a class-determining factor. Land productivity in isolated locations is often lower than for fields close to villages or towns with services like roads, electricity, housing, schools, clinics, water for domestic use, etc.

Accessibility to land:
Accessibility to land is very important in land deals. Well-established infrastructure and available good quality irrigation water are very important. Difficult-to-access terrain should be avoided for most mechanization work and land should be located close to markets.

4.4. Land Quality Valuation Minimum Data Set

There is no unique data set with which all soil and environmental related problems may be evaluated. Minimum data sets do in fact exist but they are aimed at well-defined purposes and are scale and time dependent.

The data set and the allowable limits for various parameters are for specific conditions, i.e. specific crops, climatic conditions, envisaged cultural practices, degree of mechanization, etc. For example, rain fed and irrigated agriculture require different data sets: issues like soil salinity, irrigation water quality and sodicity are more relevant to irrigated agriculture.

Crops like tea, rubber, oil palm, can be grown on steeper slopes. The soil type and irrigation management affects the maximum allowable concentration of salts in the irrigation water. The data set in Table 4.14 is a suggested set that may be used for a particular crop. No limits have been provided for the parameters because these are very crop specific and depend on management skills.

Table 4.14: Minimum data set of environmental parameters to be used in land valuation

Land quality category	Land parameter	Indicator in land valuation	Values or units
Chemical soil quality	Soil organic matter	Soil fertility, stability, erosion extent	Percent C in top 30 cm
	Cation exchange capacity	Nutrient retention	Meq/100 g of soil (millequivalents per 100 grams of soil).
	pH	Biological and chemical activity thresholds	Compare with upper and lower limits
	Electrical conductivity of saturated extract	Salinity hazard	Compare with upper and lower limits, dS/m
	Extractable N, P and K	Plant available nutrients and potential for N-loss; Productivity	Kg/ha in top 30 cm

Physical soil quality	Texture	Water retention and infiltration, erosion risks	Percent sand, silt, clay
	Depth of topsoil and effective soil depth	Productivity potential, erosion status	cm
	Infiltration and soil bulk density	Potential for leaching, productivity and erosivity	cm water per hour; g/cm^3
	Water holding capacity	Water retention, transport, erosivity	Available water in the rooting zone in mm /m depth of soil
	Depth to water table over significant periods	Oxygen sufficiency in the root zone, humidity	cm
Soil Biological	Microbial biomass C and N from OM	Microbial catalytic potential and repository for C and N	Kg of N or C per ha in the top 30 cm of the soil
Climate and irrigation water	Annual precipitation and/or duration of wet season	Water availability	Length of wet season
	Temperature	Energy availability	Mean annual temperature
	Sunshine hours	Energy availability for ripening	
	Electrical conductivity in irrigation water	Salinity hazard	dS/m
	Quantity of water for irrigation	Potential for irrigation	mm/h
	Flooding	Risks/ water control	Months
Topography	Slope	Ease of mechanization and water control. Erosion hazard	Percent

Source: Adapted from Doran and Parker, (1996)

CHAPTER 5
CREATING CONDITIONS FOR THE SUSTAINABILITY OF LARGE-SCALE LAND DEALS

CHAPTER 5 - CREATING CONDITIONS FOR THE SUSTAINABILITY OF LARGE-SCALE LAND DEALS

5.1 Introduction

For large-scale land deals to be sustainable, they must be win-win investments both for the host country's population and for investors. This means that these acquisitions should be socially, culturally and politically correct, environmentally friendly, economically profitable and should contribute towards the socio-economic development of the area in which the land is located. Most of the deals concluded so far do just the opposite; they are perceived (Sulieman, 2016; Vandergeten and al. 2016) to:

- Be land grabbing.
- Benefit mainly investors and a few local elites.
- Destroy the local population's livelihoods.
- Enhance food insecurity and poverty.

In addition, most of the land deals in Africa are leased but there is little or no monitoring of the land use to maintain the land's intrinsic quality.

If properly carried out, large-scale land deals can be effective development opportunities for the host country and can result in win-win investments. This section proposes to consider the following issues and safeguards that can better inform the type of decision-making, that will lead to create the enabling environment for these deals to be sustainable:

- Developing optimum land use plans.
- Enforcing sustainability policies and regulations.
- Using an Integrated land valuation.
- Ensuring Water governance and water management plans.
- Considering investment options other than leasing or sale of land.
- Ensuring Balance in negotiation power of land deal contracts.
- Providing Long term monitoring of the land use.

5.2 Optimum Land Use Plan

Land use plans at the national, regional and local levels are a prerequisite to implementing land deals development, in order for it to be sustainable and foresee long-term land quality for various uses, preventing or resolving social conflicts, and ensuring the conservation of high biodiversity value ecosystems (FAO, 1995). The same author concludes that land degradation is worse in situations where land use planning, its orderly execution are absent, existing financial or legal incentives have led to the wrong land use decisions, or/and one-sided central planning has led to over-utilization of land resources.
FAO (op. cit) defines land use planning as a decision-making process that “facilitates

the allocation of land to the uses that provide the greatest sustainable benefits". It is based on the socio-economic conditions and expected developments of the population in and around a natural land unit. These are matched through a multiple goal analysis and assessment of the intrinsic value of the land unit's various environmental and natural resources. The result is an indication of a preferred future land use, or combination of uses. A participative process with all stakeholders results in decisions on the concrete allocation of land for specific uses (or non-uses) through legal and administrative measures, which will lead eventually to the plan's implementation.

Land use planning should be carried out in a holistic manner and involve all major stakeholders in the decision-making process regarding the future of the land, and the identification and evaluation of all biophysical and socio-economic attributes of land units. This requires the identification and establishment of a use or non-use of each land unit that is technically appropriate, economically viable, socially acceptable and environmentally non-degrading.

Land use planning promotes and maintains a pattern of compatible and efficient utilization of natural resources, which concentrates development only in areas where environmental impacts will be minimized. Local land use plans are one of the essential elements that will help bring the interests of communities and investors into line, in a way that is consistent with sustainable resource use, and are key in ensuring that the most suitable land is selected for a given purpose. They can also reduce the danger that highly productive or ecologically sensitive land will be diverted to marginal uses, and provide investors with crucial information on agro-ecological conditions on a given piece of land, and the status of existing rights to that land.

Agro-ecological zoning should first be determined before carrying out land use planning at local level. According to Sombroek (1994), this is a process of quantifying the productive capacity of land resources for human use, independent of its physical and biological characteristics. This approach was developed by FAO to determine the potential population supporting capacities at national, regional and local levels. The method can identify areas that will not be food self-sufficient, indicate future food transport requirements and can also determine areas with a potential for agriculture development. The latter areas could now be considered for contracting to investors. Zoning does not include legal or administrative decisions on the future land use, which is handled by land allocation.

Sombroek (1994) suggested that zoning and land use planning are dynamic processes and should be repeated every 10 to 20 years to take into consideration the evolving socio-economic conditions as well as new advances in technology which can create new opportunities for land use or reduce previous constraints to certain kinds of use.

5.3 Enforcement of Sustainability Policies and Regulations

All large-scale land deals should be preceded by Environmental and Social Impact Assessments (ESIA). The ESIA is a process that determines the environmental and

social impacts and risks of a proposed project on an affected community and ecosystem. The ESIA can greatly help in the design of a project in that many negative social and environmental impacts can be avoided to ensure sustainable development. When impacts are unavoidable, they will need to be mitigated and/or compensated adequately and fairly.
Modifying the land use practice or adding certain project components to the initial design can mitigate unavoidable impacts. An example of a sustainable land use measure, which should systematically be prescribed in large-scale land deals for agricultural production, is climate smart agriculture (FAO, 2010). A project may also have positive impacts and hence the adopted project design should seek to enhance the beneficial aspects at a minimal cost.

Cotula, (2011) recommends that environmental concerns should preferably be regulated by specified international standards rather than by national standards only, as most African countries have poorly developed environmental regulations, which, most probably, are and will be not enforced. Unspecified standards in a contract mean very little in a court of law and hence are usually not implemented by investors. There are a number of international standards or guidelines that address social and environmental issues, which could be adopted. These include the Equator Principles and the FAO Voluntary Guidelines for Responsible Governance of Tenure of Land, Fisheries and Forests.

5.3.1 Equator Principles

This is an international benchmark that a number of financial institutions have adopted. The Equator principles entail applying social and environmental standards developed by the International Finance Cooperation (IFC). Many see these standards as best practices for the industry.

According to the IFC (2006) and to Equator Principles Financial Institutions (EPFIs, 2013), financial institutions that have adopted the Equator Principles will not finance projects if the borrower does not comply with the social and environmental policies contained in the Equator Principles.

The set of ten principles are the following (EFCIs, op.cit.): Principle 1: Review and Categorisation; Principle 2: Environmental and Social Assessment; Principle 3: Applicable Environmental and Social Standards ; Principle 4: Environmental and Social Management System and Equator Principles Action Plan; Principle 5: Stakeholder Engagement; Principle 6: Grievance Mechanism ; Principle 7: Independent Review; Principle 8: Covenants; Principle 9: Independent Monitoring and Reporting; Principle 10: Reporting and Transparency .

The action plan should describe and prioritize the actions needed to implement mitigation and monitoring measures as well as corrective actions necessary to manage the outcomes and risks identified in the impact assessment.

Financial institutions that have adopted the Equator Principles can only exert pressure during the time period of loans provided to investors. However, host countries of large-scale land deals could use these principles as a standard to be followed even after loans have been repaid. The land deal contract should specifically state that the Equator principles will be adhered to, thus ensuring full compliance. This however requires that the host African governments be well equipped to enforce the principles; civil servants will need to be trained in performing the monitoring of the principles and capacity building costs should be integrated into the deal's financial calculations.

According to Cotula, (2011), Liberia recently used the Equator Principles along with other measures to renegotiate some contracts relating to the extraction of its natural resources and ended up with a better deal.

5.3.2 FAO Voluntary guidelines

Many studies on large-scale land deals in Africa have demonstrated that, in a number of countries, one of the primary constraints to elaborate and implement win-win contracts for large-scale land deals is poor land governance. Stronger efforts need to be made to secure local land rights.

This would help protect local people from being arbitrarily kicked off their land and to also obtain better deals from investors. The principle of free, prior, and informed consent and robust compensation regimes should be the corner stone of government policy and should be integrated in the national legislation.

In this light, the Voluntary Guidelines for Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (FAO, 2011), should be implemented as a necessary and prerequisite step for host countries to follow before land deals can be encouraged to go ahead. The guidelines' objectives are enhancing governance of tenure and other natural resources with the overarching goal of achieving food security for all and to support the progressive realization of the right to adequate food in the context of national food security.

The guidelines are based on a human rights approach emphasizing universal, interdependent, indivisible and interrelated human rights. They are based on the principles of stakeholder participation, accountability, non-discrimination, transparency, human dignity, gender equity, empowerment and the rule of law.

Responsible land governance is expected to create conditions for sustainable social and economic development that can alleviate poverty and food insecurity and encourages responsible investments.

A key aspect of the responsible governance guidelines as concerns land deals is that States should facilitate and encourage markets as a means of transfer of tenure rights of use and ownership of land, fisheries and forests. The state should also facilitate efficient and transparent markets operations to promote mutually beneficial and peaceful transfers of tenure rights and create incentives for sustainable land use to enhance socio-economic development.

5.3.3 Other important issues

- The need for a reliable information base: relevant studies and baselines have to be developed in order to assess risk and opportunities and later undertake monitoring and evaluation. Despite initial investment costs, this remains a priority for sustainability as it provides the grounds for informed negotiations with no ambiguity.
- Active and informed participation is very important in the negotiation process to enhance the sustainability of deals, and in creating win-win investments. It is therefore essential to strengthen the capacity of government, civil society and communities to communicate, negotiate and control effectively.
- Disclosure of information on projects: contracts and copies of environment and social assessments should be made available to communities and interested parties in the concerned area.

5.4 Integrated Land Valuation

A sound valuation must privilege sustainability and requires an exhaustive analysis of the land deal investment. This calls for a holistic approach which includes economic, environment, social and even political considerations and attempts to weigh the relative importance of the different issues to aid in rational decision making and increase cohesion in the long term.

5.4.1 Economic costs

The land valuation should consider the loss of natural resources and quantify these in economic terms. This could be in relation to their intrinsic value (i.e. irrespective of the resource's location) or their situational value (i.e. in relation to the proximity to human settlements) according to FAO, (1995). Natural resources close to human settlements have higher situational values. Natural resources with tangible economic value include timber, non-timber forest products (e.g. fruits, vegetables, medicinal plants, etc.), fuel wood and fodder from the land's existing biomass. In addition, other promotional measures such as extension services and training and expanding the social and economic infrastructure (health centres, roads, schools) in rural areas should all be an integral part of development-oriented contracts.
The economic analysis will also include land productivity as discussed previously.

5.4.2 Environmental costs

Environmental costs result from the loss of natural resources that are "non tangible" in strict economic terms. FAO (1995) refers to these natural resources as environmental resources. They include the following:

- Biodiversity of plant and animal populations
- Landscapes' scenic, educational or research value
- Protective value of vegetation in relation to soil and water resources
- The functions of the vegetation as a regulator of the local and regional climate and

of the composition of the atmosphere
- Water and soil conditions as regulators of nutrient cycles, that influence human health and act as a long-term buffer against extreme weather events
- Disruption of existing rights and privileges for water users, downstream water flow, and effect on sensitive downstream habitats and water bodies
- Increase in solid or liquid wastes from processing plants
- Soil degradation due to irrigation and resulting in salinity and water logging

Environmental costs are very site specific and can only be estimated after the social and environmental impact assessment.

5.4.3 Social costs

When land titles and use rights have not been formalized legally or are inadequately documented, communities have little to protect them from losing land ownership or access. This may result in greater social problems because land deals may further marginalise small farmers who could unfortunately loose the basis of their livelihood. The issues to be taken into account in this context are:

- Property rights and land acquisition: even in apparently land-abundant settings, there is hardly any truly "unoccupied" land. User rights are often informal and recognized through customs and traditions. It is necessary to respect and fairly compensate existing users.
- Adequate compensation for involuntary resettlement.
- Potential loss of traditional grazing rights, water use rights and use rights for gathering food from the wild.
- Foreign direct investment in land is a problem if no additional sources of income are created for the affected population particularly when investors import labour from their own countries or works are machine intensive. When investment does generate employment, compliance to acceptable standards for wages and decent working conditions is an important aspect.

Once the Environmental and Social Impact Assessments is completed, this will also allow to evaluate specific social costs in a land deal which will arise if negative impacts cannot be avoided. These must be adequately compensated.

5.5 Water Governance and Water Management Plans

Studies by the Oakland Institute (2011), Friis and Reenberg (2010), Pearce (2013) have indicated that most land deals in Africa are taking place in the vicinity of water resources and hence offer irrigation opportunities. Many acquisitions are not only providing control over land but also over precious water resources. Some investors in land deals are chiefly interested in exporting virtual water, by using the available water to grow crops, which consume a lot of water, to then export them to their own water scarce countries. This situation of also controlling water resources arises, because of poor water governance in the host countries and may result in water insecurity.

According to UN-Water (2006), there is enough water for everyone in the world. The problem we face is largely one of governance. Water governance has to do with taking decisions on who has the right to water and who benefits; who makes water allocation decisions and who should be supplied with water, from where and how. How and for whom water is governed affects river flows, groundwater and pollution levels and determines the share of water between upstream and downstream users. For land deals to be win-win situations, African countries considering signing land deal contracts should ensure they have effective water governance.

There is no universal model of water governance that can be applied successfully to all situations. Each society has to chart its own course and determine the most appropriate governance structure. This will depend on its stage of development, available financial and human resources, traditional norms and other specificities. However, systems based on the four guiding Dublin principles (GWP-TAC, 2000) are now widely accepted by the international community as the basis for effective water governance. These principles are:

- Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.
- Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels.
- Women play a central role in the provision, management and safeguarding of water.
- Water has an economic value in all its competing uses and should be recognized as an economic good.

The GWP-TEC (2004) gives the following three ingredients as required for effective governance:

- An enabling environment determined by: a) an adequate water policy for the interpretation, application and enforcement of legislation; b) a water law that defines the rules of the game and authorizes various stakeholders to play their roles; c) regulatory instruments; and d) financial resources to sustain the organization and carry out necessary operations and investments in water-related infrastructure.
- An effective institutional framework with clearly defined roles and functions of actors; an adequate co-ordination mechanism; a forum for stakeholders to dialogue, share information and experiences and strengthen capacity; and an effective institutional capacity building program at all levels.
- Management instruments required to provide a sound basis for policy formulation, planning, coordination and investment decisions as well as for operational management and monitoring of water resources.

The implementation of good water governance based on integrated water resources management (IWRM) principles requires the elaboration of national and basin IWRM plans. This was one of the recommendations of the World Summit on Sustainable Development in 2002 in Johannesburg, South Africa, where developing nations were called upon to elaborate such plans by the year 2005. To date, few African countries have been in a position to do so. However, effective water governance can be implemented without an IWRM plan. The key is to have water laws and water policies which address the three ingredients of good water governance mentioned previously. South Africa for instance, does not have an IWRM plan but has put in place a set of laws and policies that could create the conditions for effective water governance.

One of the key elements in the institutional framework for effective water governance is an effective and functional coordination institution where decisions are taken at the lowest level possible in arrangements such as Autonomous River Basin Authorities. The Authority should have the power to grant water abstraction licenses, collect abstraction fees and sanction water polluters among its functions. Such an authority would also regulate water use by investors in large-scale land deals.

5.6 Consideration of Alternative Investment Options

There are many profitable investment options that may be considered other than the sale or lease of land. Vermeulen and Cotula, (2010) presents some of these:

- Contract farming where pre-agreed supply agreements are made between farmers and buyers.
- Lease contracts in which there is profit-sharing rather than a fixed fee.
- Joint ventures which entail co-ownership of the business. In this framework, a community could provide land as its own contribution to the business.
- Any variation of the above.

There is no single model that could best fit all circumstances. What works best for both parties, i.e. community and investors, is context specific and depends on land tenure regulations, government policies, culture, history as well as biophysical and demographic aspects. Care must be taken in the contract details to ensure that the arrangements are truly win-win.

5.7 The Negotiation Team

Elaborating a win-win contract with a multinational cooperation or a rich and powerful developed country who has access to world-class experts in all relevant domains related to the land deal requires that the host country put together a world-class, highly motivated and multidisciplinary negotiation team of a minimum 5 to 7 specialists. These experts should have a similar expertise level as the one the specialists hired by the investors have, to ensure balance in negotiation skills and power.

Members of the team should include an Economist or Agro/environmental Economist;

an Environmentalist, Land Specialist or Soil Scientist; a Legal Expert, a Financial Specialist with expertise in financial analysis of social and environmental costs of natural resources; a Socio-economist or Sociologist Experts. The team should advise the concerned stakeholder (Government, Local Authority, community…) or preferably participate in the negotiation process to ensure that a fair deal is arrived at.

A study by Cotula (2011) concluded that some large-scale land deal contracts feature better terms than others. For example, a deal could feature higher and better distributed revenues, while another contract could involve a sophisticated partnership with the host government and local farmers, and applies international social and environmental standards. There are examples of emitted contracts that stand out for their flexible duration, clear identification of the land being transacted, specific investor commitments on jobs, training, local procurement and local processing, greater attention to local food security, and tighter social and environmental safeguards. These contracts ratified by parliament and are available on the Internet. Determined political leadership, a strong government negotiating team, world-class legal assistance and effective use of financial analysis could make this outcome possible.

5.8 Other issues

The land rental value should be set while assuming the investor will meet agreed performance standards in regard to land quality. Fines need to also be determined, should the investor not meet their obligations. An evaluation should be carried out every five years by a reputable independent national or international firm to determine if indicators of land quality are satisfactory. This cost should be incorporated in the land rents and directly paid for by the landowner.

Each country should create a Special Unit in charge of large-scale land deals in an appropriate Ministry. This Unit should have the capacity to carry out land valuation and monitor land quality for all large-scale deals within a country. The operational costs of the Unit, including capacity building should stem from land rental fees.

<u>Key Points</u>

(i) If properly carried out, large-scale land deals can be effective development opportunities for the host country and can result in win-win investments.

(II) The Voluntary Guidelines for Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (FAO, 2011), should be implemented as a necessary and prerequisite step.

(iii) This technical guidelines stressed the need for: (a.) developing optimum land use and land master plans for planning and monitoring purposes, (b.) enforcing environmental, agricultural and social sustainability policies and regulations (c) adopting an integrated land valuation based on land suitability; (d) implementing water governance and integrated water resources management plans; (e) including water as an economical value in land deals; (f) considering investment options other than leasing or sale of land; (g) balance in negotiation power with a minimum of 5 to 7 skilled Experts in land deal contracts; and (h) Five years terms of monitoring the land use as important safeguards that will lead to maintain the quality of land resources in land deals.

CHAPTER 6

MONITORING LAND QUALITY FOR ENVIRONMENTAL SUSTAINABILITY

CHAPTER 6 - MONITORING LAND QUALITY FOR ENVIRONMENTAL SUSTAINABILITY

6.1 Introduction

Ensuring that land is sustainably managed requires monitoring its use and this is essential in all land deals. One of the main problems arising from poor land management is land degradation or reduced capacity for the land to perform certain ecosystem functions and services. Land degradation can be caused by erosion, nutrient depletion due to soil mining, desertification (Thiombiano, 2000), salinity and chemical contamination caused by pollution. Land degradation results in: loss of soil and soil productivity, surface and ground water pollution, modification of the hydrological cycle, a weakened ecosystem resilience and less capacity for the land to store carbon.

Large-scale land deals usually have long leases that meet the requirements of development projects for long-term land security. Monitoring land quality should therefore match this time period and require a mechanism to monitor the land use in a systematic manner throughout the life of the contract. There is a need to improve the track record of many African states in monitoring environmental impacts of development. Some countries have very good environmental laws and regulations but lack the capacity to enforce them due to ineffective regulatory agencies. To ensure compliance, a new approach is required.

One option to ensure sustainable land use is to include a clause in the land deal contract requiring that the investor's operations be certified by the International Standard Organization (ISO) using its ISO 14 001 standard. This certification can be relied upon as it is carried out by external certification authorities. ISO certification is highly attractive for investors and ensures that they set up an Environmental Management System (EMS) to collect data that can be audited by a certification authority that can warrant compliance.

Incentives encouraging investors to be ISO 14 001 compliant could include a rent reduction per ha and high penalties for non-compliance.

6.2 ISO and the Environment

6.2.1 The International Standards Organization

The ISO, established as a non-governmental organization in 1947, is a worldwide federation of national standard institutions. Its mission is to promote the development of standards in order to facilitate international exchanges of goods and services and to strengthen cooperation in intellectual, scientific, technological and economic activities. The ISO currently has 163 member countries (ISO, 2016). Its activities result in international agreements, which are published as international standards. The ISO standards are voluntary and each country chooses whether to make them mandatory or not and some adopt them as national standards. ISO 14 000 family of standards can be certified independently by certification bodies in different countries.

6.2.2 IS0 14 00 family of standards

ISO 14 000 is a family of standards for environmental management and is the most visible part of ISO's activities linked to the environment. This ISO 14 000 family offers standardized sampling, testing and analytical methods for monitoring features and attributes such as the quality of air, water and soil. The aim is to provide scientifically valid data on the environmental effects of economic activities, which may be used as the technical basis for environmental regulations. ISO standards define what data should be collected and how to collect them so as to have a basis for comparison. ISO standards do not indicate a threshold or limit for any values.

6.3 ISO 14 001

The Sub Committee SC1 is in charge of the formulation and revision of ISO 14 001 for environmental management systems. From 1999 to 2015, around 34 African countries have obtained certification for 14 001. The highest requests for certification are from South Africa and Egypt with respectively 1192 and 850 submissions in 2015 only.

6.3.1 Certification

ISO 14 001 specifies the following five stages for establishing an Environmental Management Systems (EMS) that is important for land deals:

- Developing an environmental policy: This is the primary component of the ISO 14 001 standard and is a documented statement of commitment by the top management of an organization. This environmental policy must include a commitment to comply with environmental laws currently in force and company policies, continual improvement and pollution prevention. An EMS is then created or documented that translates the policy into action.
- Elaborating an action plan that includes environmental aspects, legal and other requirements, environmental objectives and measurable targets and an environmental management program. Setting environmental objectives and targets is critical to success. The objectives must be reasonable and achievable, and based on practical considerations rather than being arbitrarily chosen.
- Implementing the action plan: the programme is implemented to monitor activities that meet objectives and targets: Staff roles and responsibilities to implement the action plan must be clearly defined, provision made for training and awareness raising on the EMS, communication of all relevant information about EMS to all staff, documentation of the EMS, etc.
- Checking and corrective action: this includes regular monitoring and measuring of all activities that can have a significant impact on the environment and keeping records of these; defining responsibility and authority for dealing with control of non-compliance to the EMS; auditing the EMS on a periodic basis to provide assurance of compliance.
- Management review: a review mechanism should be provided for the EMS. This should be carried out by senior management who can decide to implement changes

that may be required in the EMS such as changes in policies, objectives and targets based on the outcome of the audit, etc.

The commitment to comply with applicable environmental legislation, regulations, norms and international standards, along with a commitment to continual improvement is particularly important to be highlighted in land transaction contracts.

Fulfilling the ISO 14 001 requirements demands objective evidence that can be audited to demonstrate that the environmental management system is operating effectively in conformity to the standard.

6.3.2 Value of ISO 14 001 certification

ISO 14 001certification can be used as a tool to meet an organization's internal objectives, including:

- Ensuring management that the impact on the environment of organizational processes and activities is under control;
- Ensure employees that they are working for an environmentally responsible organization.
-
- It can also be used to meet external objectives, including:
- Providing external stakeholders – such as customers, the community and regulatory agencies – with the assurance that environmental issues are taken into account;
- Complying with environmental regulations;
- Supporting the organization's claims and communication about its own environmental policies, plans and actions; and/or
- Providing a framework that demonstrates conformity.

6.4 Use of ISO 14 001 to Monitor Land Use

ISO 14 001 is complemented by ISO 14 004. The later is a document providing advice that may be used for guidance. It stressed the need to (i) improve environmental performance; (ii) respect conformity obligations; (iii) meet environmental objectives . To this effect the compliance to monitor land use is essential to ensure sustainability.

Due to the specificities of large-scale land deals, the following "other requirements" should be included in the land deal:

1. Any importation of agrochemicals should be subjected to the Rotterdam Convention Governing Trade in Hazardous Chemicals and the Application of its Attendant Prior Informed Consent (PIC) procedures between the importing country and the exporting country.
2. The use of any foreign germplasm should be in accordance with the International

Treaty on Plant Genetic Resources for Food and Agriculture (IT/PGRFA) and the International Plant Protection Convention (IPPC), which govern the sharing of plant genetic resources and the regulation of the movement of plants and plant products in international trade respectively.

3. The EMS should commit to carrying out climate-smart agriculture. Climate-smart agriculture is intensive agriculture with sustainable high productivity that enhances the achievement of national food security and developmental goals and responds to environmental concerns linked to climate change (carbon sequestration), preserving biodiversity and protecting watersheds. Agricultural sustainability is defined in terms of maintaining soil quality and the minimum data for this as contained in these guidelines. Two aspects of climate smart agriculture need to be met:
   - Food security
   - Environmental sustainability

Regarding environmental sustainability, the EMS's target should be to continually strive to maintain land quality in its original condition within the limits of the available technology and at a reasonable cost. Quality should be maintained from the following perspectives:

- Carbon sequestration
- Biodiversity
- Soil quality
- Water quality
- Watershed health

This therefore requires to determine initial values for indicators of the above parameters by using ISO standard procedures during the ESIA. This will ensure that values can be compared later on, during monitoring.

The project design should therefore seek to maximize carbon sequestration and the area of riparian buffer forest, minimize loss of biodiversity and maintain or enhance soil and water quality. This should appear in the company's environmental policy. After project implementation, the EMS should continually strive to improve the organization's environmental performance. Climate smart agriculture should be based on conservation agriculture, the use of riparian forest buffers and agro-forestry. This will ensure that land quality is protected.

The organization's environmental performance levels could be defined nationally on top of the ISO 14001 standards. In the absence of national performance standards to monitor land utilization, those used by countries with a good environmental track record could be adopted.

Requirements before a contract for a land deal is signed should therefore include that the investor:

- Elaborate an environmental policy and commit to practice climate-smart agriculture to ensure food security and environmental sustainability and,
- Set up an EMS that is ISO 14 001 compliant, respect international Conventions and national performance standards.

It should be noted that companies that have attained an ISO 14 000 certification may be considered a priori as fully compliant with environmental regulations. However, the regulatory agency should still actively verify the circumstances under which the certification was obtained to check if it is consistent with national environmental legislation.

Although ISO has developed standard procedures for measuring various parameters of water, soil and air quality, the organization does not prescribe what type of measurements should be carried out nor does it prescribe the limits of acceptability for measured values. Users have the responsibility to identify the relevant parameters to measure in a given situation; and countries are to specify limits of acceptability for a given parameter under a certain situation.

6.5 Indicators for Monitoring Land Quality

The critical factor in land management is to maintain or enhance its quality. Land quality refers to the land's capacity to function with its natural or managed ecosystem in order to: support human health and habitation, sustain plant and animal productivity and enhance or maintain air and water quality. With global warming concerns, good quality land should mitigate climate change by storing carbon and reducing greenhouse gasses. Although the investor will elaborate an environmental policy prior to a land deal as described above and the EMS will preferably be ISO 14 001 compliant, the national regulatory agency must monitor land quality to ensure compliance. This will take into account four aspects that minimize land degradation discussed previously in paragraph 6.4, and requires developing or selecting indicators to monitor these aspects.

The trends and performance in the selected indicators need to be monitored, interpreted and reported. Dumanski and Pieri (2008), Thiombiano (2000) suggest that good quality indicators for land quality measurements should:

- be measurable over the whole landscape;
- reflect change over recognizable time periods (5 to 10 years);
- be a function of independent variables; and
- be quantifiable and usually dimensionless.

6.5.1 Soil quality

Monitoring the relevant indicators and comparing actual measurements with target values can determine changes in soil quality. For large-scale land deals, the target values should be those measured at the site before the investor's development. Monitoring should provide information on the effectiveness of the farming system, land use practices, technologies and policies. A farming system or policies that contribute negatively to any of the selected indicators should be considered potentially unsustainable and thus discouraged or modified. Systems that improve performance of the indicators should be promoted to assure sustainability. Nutrient flow analysis (FAO, 2005) can be used by scientists to evaluate various agricultural systems or practices to determine those that are most effective in maintaining or enhancing land quality and hence sustainability. Based on their performance, these can therefore be recommended and promoted.

Soil quality needs to be monitored to sustain plant and animal productivity. The key issues here are minimizing loss of soil (erosion) and loss of soil productivity . *Land cover* can be used as a surrogate for erosion (Dumanski and Pieri, 2008). Land cover describes the extent, duration, and timing of vegetative cover on the land during major erosive periods of the year. This indicator could be obtained by remote sensing.

Soil productivity is directly related to the type and amount of the soil organic matter (Mitchell et al., 1996). Emphasis should be placed on the dynamic carbon pools that are most affected by environmental conditions and land use change. The type of crop grown affects organic matter; amount of roots, biomass, harvest efficiency and the way residue is managed (Magdoff, 1993). Organic matter increases with high residue crops in rotation with cover crops and conservation tillage compared to monoculture and conventional tillage. The number of microorganisms in the soil is proportional to the organic matter content in the upper 30 cm (Schnitzer, 1991; Thiombiano op.cit.), hence the higher the organic matter content, the higher the microbial biomass. Soil organic matter therefore can also be used as an indicator of below ground biodiversity.

According to Dumanski and Pieri, (2008) and Rattan, 2016, soil organic matter (SOM) is the best surrogate for soil health, since SOM reflects the residue of plant and soil organisms that have lived and died in the soil. The basic functions of SOM are to develop and maintain soil structure, nutrient and organic carbon storage, and uphold biological activity. Thus, SOM acts as the primary source and a temporary sink for plant nutrients and soil organic carbon in agro-ecosystems, maintains soil tilth, helps water infiltration and soil aeration, promotes water storage, reduces erosion, and controls the efficacy and fate of pesticides.

Because of the interactions between various soil quality parameters, a minimum number of indicators should be measured to evaluate changes in soil quality resulting from various management systems. Additional indicators of soil quality to be monitored are:

- Salinization - electrical conductivity of saturation extract.
- Soil aggregation – bonding together of primary soil particles (sand, silt, clay) to form aggregates, usually by natural forces and substances derived from root exudates and microbial activity.
- Nutrient loss or imbalance - measuring trends in N, P, K and SOM. Two situations

are possible: a) nutrient mining could result in decreasing yields or b) excessive applications of fertilizers and manure that may cause nutrient loading resulting in environmental degradation due to nitrates and phosphates leaching.

- The trend in the crop yield compared to potential farm level - Economically feasible yields can be used as an integrator of soil quality. This indicator however needs to be used with caution because there are other factors that have an impact on yield such as cultural practices, respecting the agricultural calendar, climate change, actual rainfall, land management, etc. A comprehensive analysis should therefore be carried out to determine what forces are causing the change in yield.
- Infiltration and runoff - These two variables are closely related. As we are dealing with large areas, infiltration should be determined in some typical watersheds using a water balance method. Rainfall, evapotranspiration and runoff should be measured and the infiltration estimated as a residual. A reducing trend in infiltration will suggest that there could be increasing soil crusting from poor soil cover, soil compaction (restrict movement of water and nutrients, roots confined to the top soil and retard gas exchange), etc. This will translate in increasing runoff from the land (with increased potential for soil and nutrient loss and pollution of surface water bodies). The infiltration of selected sites should be determined prior to development so that the monitoring target will be to match the initial values. The infiltration could be expressed as a percentage of rainfall.
- Turbidity of runoff: this could be estimated by remote sensing and used to quantify erosion.

6.5.2 Biodiversity

The International Convention on Biological Diversity defines biodiversity as the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part. It includes diversity within species, between species and of ecosystems. The variability and diversity of animals, plants and micro-organisms sustain key functions of the agro-ecosystem that support food production and food security (FAO, 1999) as well as ecosystem service provision (Nielsen and al.,2015). Biodiversity indicators should consider the genetic variability as a basis for valuing both species diversity and ecosystem diversity. Ecosystem diversity should be used as an indicator to evaluate the sustainability of land resources and management, genetic, species.

Agricultural production systems usually result in a reduction of biodiversity with ensuing weakened ecosystem resilience. Two types of diversities can be identified in agricultural systems. These are land use diversity (agro-diversity) and agro-biodiversity (Dumanski and Pieri, op.cit.). Land use diversity is the degree to which production systems are diversified in the landscape, including livestock and agro-forestry systems. It is the antithesis of mono-cropping and a useful indicator of flexibility and resilience in farming systems, and their capacity to absorb shocks or respond to opportunities. Agro-diversity is assessed by the number, kind and complexity of components in the farming systems, but it can also be estimated from the number and kinds of crops grown per season, the extent and frequency of rotations, presence or absence of livestock in the production systems, etc.

Agro-biodiversity involves managing the gene pools utilized in crop and animal production, but also soil micro and meso-biodiversity important for soil health. On a macro scale, it involves integrated landscape management that includes maintaining natural and semi-natural habitats, as well as managing the coexistence of wildlife in agricultural areas. The ratio of the area covered by natural or semi-natural agricultural habitats to the total land area could be used as an indicator of this diversity in addition to the SOM discussed previously for below-surface biodiversity.

Agricultural production systems based on climate-smart agriculture will have high agro-biodiversity and should therefore be promoted.

6.5.3 Carbon sequestration

Traditional agricultural intensification and natural resources exploitation usually lead to a reduction in the land's capacity to store carbon. Agricultural systems which have high agro-diversity, high SOM and high agro-biodiversity, will also have good properties for sequestrating carbon by practicing agro-forestry. A high SOM indicates good land quality as a carbon sink. The ISO 14 064 standards present scientifically acceptable methods for quantifying carbon sequestration. These methods should be used to quantify the amount of carbon stored within the exploitation concerned by the land contract.

6.5.4 Watershed health

The focus here is to minimize surface and ground water pollution as well as modifications of the hydrological cycle. The biological oxygen demand (BOD) is usually used to measure the extent to which the water is contaminated by organic matter as it determines how much oxygen is being used by aerobic microorganisms in the water to decompose organic matter. When aerobic bacteria use too much oxygen, this affects the water body's health, as there is not enough left for the fish, insects, and other organisms that rely on oxygen.

A high oxygen demand may result from fertilizers such as nitrates and phosphates flowing from agricultural runoff into water bodies, stimulating the overgrowth of plants and algae (eutrophication). It may also result from food processing plants and wastewater treatment plants discharging organic waste into water bodies. As the high populations of plants and algae or the organic matter discharged directly into the water begin to decompose, they consume a lot of oxygen.

The chemical oxygen demand (COD) is also used to determine water quality. It does not differentiate between biologically available and inert organic matter, and it measures the total quantity of oxygen required to oxidize all organic material into carbon dioxide and water. COD values are always greater than BOD values, but COD measurements can be made in a few hours while BOD measurements could take up to five days.

Soil infiltration and land runoff should also be monitored to ensure there is little or no modification to the hydrological cycle as a result of land development. If the ratios of infiltration/rainfall and runoff/rainfall are about the same as for undeveloped land, this suggests there is little modification to the hydrological cycle.

Using riparian forest buffers and practicing conservation agriculture will greatly help in reducing soil and nutrients runoff into streams.

6.6 Minimum Data Set

A minimum data set for monitoring land quality should be sufficient to assess changes in land quality over time. An adequate minimum data set should allow for monitoring changes in land functions stemming from a particular cropping pattern, a specific tillage system, and overall management. Selecting land quality indicators is based on the key land functions which respond to primary management goals to maintain soil quality, preserve biodiversity, mitigate climate change and preserve the health of watersheds. The following list summarizes the minimum data required to monitor land use to ensure sustainability in land deals.

- Trends in organic matter, N, P, K in the soil
- Land cover during major erosive period of the year as a percentage of the cultivated area
- Electrical conductivity of saturated extract
- Soil aggregation
- Trends in crop yield
- Infiltration into the soil and runoff from the land
- Nitrates and phosphates in surface and ground water
- Turbidity, COD and BOD of surface water
- Number and kinds of crops grown per growing season, the extent and frequency of rotations, presence or absence of livestock in the production systems, etc.
- Ratio of area covered by natural or semi-natural agricultural habitats to total land area.

Values of the above parameters as well those from the land valuation (paragraph 4.4) should be determined during an ESIA, which should be conducted before signing a deal. The initial values will then become targets that the investor will continuously strive to attain through the EMS. ISO standard methods and procedures should be used in determining these indicators.

Key points

(i) Large-scale land deals usually have long leases and systematic mechanism to monitor land quality and environmental changes and report should match this time period.

(ii) An option to ensure sustainable land use is to include a clause in the land deal contract requiring that the investor's operations be certified by the International Standards Organization (ISO) using its ISO 14 001 standard. Importantly, due to the specificities of large-scale land deals, "other requirements" related to national aspects should be included in the land deal.

(iii) Minimum data required to monitor land use to ensure sustainability in land deals should be determined during the land valuation and the Environment and Social Impact Assessment and should be within the contract/ deal.

CHAPTER 7

CONCLUSIONS

CHAPTER 7 - CONCLUSIONS

Large-scale land acquisitions are seen and promoted by governments as opportunities to attract the much needed investment particularly into agriculture. However, many of the deals have been concluded in countries with weak land tenure governance and where land tenure and legislation is complex, and land valuation insufficient. Hence, (i) emerging land conflicts from trend of violation to the rights of the local communities; (ii) the very low price of land in Africa in comparison to land values in other parts of the world; (iii) as well as high risks of environmental degradation

As interest in purchasing or long-term leasing of large portions of land, particularly in Africa is projected to grow, efforts have to be made to sustainably make "win-win deals", to make investments be effective inclusive development opportunities. As it stands, a number of grey areas ought to be clarified for example duration of land leases (vary from 25 to 99 years), what is or should be the interest of the host countries in these deals; the impact of these deals on food sovereignty; would food crops be used for local consumption or exported in times of famine in the investors' country; is there enough productive land for crop production and planting of crops to be used in the production of agro-fuels?

These Guidelines focused at an arrangement that benefit both the country, investors and local communities and highlight technical and socio environmental areas to foster sustainability. It provide a basis for win-win investments that effectively contribute to the socio-economic development of the countries as well communities while addressing current and future challenges related to climate change.

It argues that low land rates can be attributed to inadequate or disregard of land productive capacity in analysis, and proposes a framework to adequately appraise land in monetary terms, that include the land suitability economics. It recommends as safeguards for land deals contracts:

- Developing optimum land master and land use plans at appropriate scale;
- Enforcing sustainability policies and regulations, norms and international standards; and requirements from Conventions
- Using integrated land valuation method that includes the land productive capacity;
- Including water governance, water economical value and water management plans;
- Considering investment options other than leasing or sale of land; and/or flexibility of the duration according to the land use
- Balancing in negotiation power of land deal contracts with dedicated 5 to 7 Experts Team;
- and Long term monitoring of the land use, as that will ensure the sustainability of land deals.

It calls for implementation of The Voluntary Guidelines for Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (FAO, 2011), as a necessary and prerequisite step.

It’s also call for Social Responsibility of Enterprises (Thiombiano,2013) and Investors to ensure an effective win-win and inclusive development.

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Over the last few years, agribusinesses, investment funds and government agencies have demonstrated a growing interest in acquiring large portions of land, mostly in developing countries and particularly in sub-Saharan Africa. In the host countries, investors and government see these acquisitions as opportunities to attract foreign investment that will enhance food and energy security and stimulate socio-economic development. Analysing a number of these deals in Africa suggests that these objectives are usually not attained and that their sustainability appears to be uncertain.

Even though tenants and landlords take into account environmental aspects when negotiating land deals, there is a lack of technical measures and tools to guide these negotiations. The aim of this document therefore is to provide technical guidelines to be used as a tool that may foster an enabling environment for sustainability and provide a basis for win-win investments that effectively contribute to the socio-economic development of the host countries; this is feasible when the arrangements benefit both the investors and the majority of the population in the given area.

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