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# Role of Soil Science in Achieving Sustainable Food Security – Presence and Future

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## ABSTRACT

The opportunity has been taken to bring the awareness for the revitalization and rehabilitation of agricultural development through the consideration of the role of Soil Science and soil resources. This has been necessary to support industrial food development and create chances, to allow for soil improvements, which are of economic values for the millions of people, globally. Food security, revenue earnings and quality life are obvious in global economic development if the soil resources would be utilized in a sustainable manner. However, decrease in food availability is a problem that may be partly influenced by human development in the aspects of agricultural setback, population growth, environmental contamination and corruption among others. Soil and soil resources offered many sustainable economic opportunities in the transformation and improvements of crop production. Agricultural soils need to be expanded and enlarged through advancement of soil and soil resources advancement. Knowledge of Soil Science would emerge as an alternative in achieving food security in the presence and future through increased food availability, desert/wasteland transformation, sustainable waste management and compost technology. This paper reviewed the roles of Soil Science in achieving sustainable food security with the hope to bring opportunities to develop important research objectives to create chances for future environmental soil management and sustainable food security.

**Keywords**: Soil Science, Food security, Soil dimension

## INTRODUCTION

Available and affordable food in any society is a sign of strong economy and lovely environment. An increase in human population requires increased foods availability, shortage of which may results to hunger, malnutrition and social crises. Knowledge of Soil Science is one of the alternative waysin Agriculture that can help achieve food security and sustainable economy (Usman and Kundiri, 2016). Soil Science is a practical science that is focused on educating the thoughtful of soils and how they functions for many vital applications including agriculture, engineering, landscaping, sports, and human developments (Usman, 2013). It was emphasized that any contribution in the field of Soil Science related to sustainable development must focus on soil quality development to increase food availability (Lal, 1998; Usman, 2013). Thus, ensuring food security would have been more transformed if soil and Soil Science contemplate on the future objectives of sustainable economic development of the growing world population. This is reasonable, if we can manage to acquire environmental information relevant to all aspects of global agricultural development including soil and environment, water bodies, housing estates, health issues, and management resources. Differences on how each geographical area develop and the factors responsible for its expansion are motives to consider the present/future role of Soil Science in achieving food security. This has been a matter of concern that reached the climax of acceptance with several observations and opinions outlined by some members of International Union of Soil Science (IUSS) (Hartemink, 2006a). Therefore, achieving agricultural sustainable development must consider three important issues stated by World Economic and Social Survey in 2013: sustainable cities, food security and energy transformation (DESA, 2013). These three issues are all connected with soil and its surrounding environment. For example, food security would never be achieved if soil quality is poor or not sustainably managed (Mueller *et al.,* 2010; Usman, 2013). Despite the great importance of soil in sustainable economic developments (Usman and Kundiri, 2016a), there are needs to expand investigations in the aspect of sustainable food security. These investigations must be done in ways that all components of Soil Science are included.

The establishment of the International Society of Soil Science (ISSS) in 1924 has led to the significant expansion in all aspects of global agricultural and engineering developments. The creations of Commissions, Sub-commissions, Working Groups and Standing Committees are resources, which had practically dealt with all aspects of soil research and management (e.g. Hartemink, 2009a). The role of Soil Science appears to receive a welcome invitation and become part of global means of addressing issues of high concern – food security, environmental management and quality. The ISSS and other local and national Soil Science organizations, majority of which are based in UK, US and Russia played a major role in promoting and endorsing Soil Science as a discipline. Before and after World War II (1900 to 2016), Soil Science has provided many functional services to the achievements of food security and economic development of many nations in tropical and temperate regions (Hartemink, 2002). Soil Science has supported different components of human development for over 100 years (Hartemink, 2009a). And, has a successful history at international perspectives in bridging many important gaps in developments of agriculture, sustainable economic development and better rural livelihood (Yaalon and Berkowicz, 1997). This paper provides an out look on the dimension of Soil Science and the perspectives that it could play a leading role in achieving sustainable food security in the 21$^{st}$ Century.

## Soil, Land and Environment – *not the same words*

Understanding the typical differences and relationship between soil, land and environment, could help other people working in various departments of science and technology to have an insight on how the role of Soil Science provides functional services to the sustenance of life on Earth. For many people soil, land and environment are viewed as one entity and thus, results in an oversight of the underpinning the role of soil within landscapes due to lack of division in their meanings (Koch *et al.,* 2013).This division is important because of the fact that failing to recognize soil as aprofitablebodyfrom land and environment, would lead tothe lossof visibility inunderstanding the true image the role of Soil Science played in the global economic development (Koch *et al.,* 2013). According to Usman (2013) the word '*Soil'* means different things to people with different scientific, social and cultural background. This concept can be looked from the viewpoint of soil science, agronomy and drainage condition (Ritzema, 1994):(1) soil science: soil is that part of earth' crust where soil has formed as a result of various interactive processes (physical, chemical and biological); (2) agronomy: soil is the medium in which plant roots anchor and from which they extract water and nutrients; and (3) drainage engineering: soil is a matrix with particular characteristics of water entry and permeability. These three definitions entailed that soil is a natural body of animal, biota and biodiversity, mineral and organic constituents differentiated into horizons of variable depth and shapes, which disagree from the material beneath in morphology, physical structure, chemical properties and composition, and biological characteristics (Soil Survey Staff, 2010; Brady and Weil, 2014). However, the word' *Land*' is an autonomous body that consists of soils and their physical, chemical biological, ecological, and hydrological components, which can be evaluated visually as parent materials (soil particles: sand, silt, clay; rocks and fragments), water bodies (rivers, lakes, oceans), forest and vegetation (Lal, 2010). However, the word '*Environment'* refers to all components of land including the human population, living and non-living things, which are below it, in the water bodies, in the atmosphere and surrounding the Earth surfaces (Usman, 2013).

## Soil Science Dimension

Soil science has made enormous contributions to the increase in agricultural production – a dimension that was understood by soil scientists in 100 years (1909 – 2009) of its advancement as the foundation for agriculture (Hartemink, 2009a, b; Brevik and Hartemink, 2010). The dimension of Soil Science can be looked from different perspectives – social, economic, political, historical, educational, cultural and geographical. For example, in sub-Saharan Africa, understanding the inputs and outputs of the key problems associated with lack of achieving food security can be accessed through the records of available researches in the region. Numerous of these researches were published at national and international levels (e.g. Hartemink, 1999; Hartemink *et al.,* 2001). However, many are not made available to the public – but only in the record of the universities produced by students at all levels. Nonetheless, soil science focused on improving the understanding of soils and how they functions for many applications – agriculture, engineering, landscaping, sports, and social events (Usman, 2013).

The soil is the most important components of Soil Science in achieving food security – a measure that indicates an integrated involvement of soil biologist, pedologists, soil fertility experts and soil economists. This dimension in its self is sometimes difficult to define, but our efforts during the involvement processes would help to understand the requirements as well as the problems related to soils and factors hindering the achievement of food security, globally.

The presence and future challenge in the field of Soil Science is also a subject which has been measured by diverse opinions from the soil scientists (Hartemink, 2006a). Soil degradation in form of soil erosion, desertification, and nutrient depletion, was considered the major threat to soil and food security (FAO, 1995; Lal, 1998; Eswaren *et al.,* 2001). These soil problems must be addressed at all angles of global agricultural soils the role that the experts in the field of soil management and soil conservation could proffer solutions through integrated ideas. Perhaps, a better way of sustainable soil management and ensuring food securitycan be achieved through collaboration with farmers and local observers. This idea may be useful to the professional soil scientists in delivering the concept of Soil Science towards achieving sustainable food security globally. This has further indicates the need for soil science amateurs (Table 1) – attracting more people to soil science (Koppi *et al.,* 2010). This role of soil scientists in collaborating with other people has provided many developments in achieving food security (e.g. Koppi *et al.,* 2010).

However, linking Soil Science with other scientific disciplines (Figure 1) and generating information through analytical methods remained the most important course (Hartemink, 2006a).

In another dimension, nutrient balance (or budget) was considered a useful tool in soil research and agronomic studies, primarily because it provided insights into the sustainability of soils and food security from a nutrient perspective (Hartemink, 1997). Stoorvogel and Smaling (1990) provided information on nutrient depletion indicating input and output factors. In their perspectives, the nutrient inputs are mineral fertilizers, animal manure, atmospheric deposition, biological nitrogen fixation, and sedimentation; and the nutrient outputs include harvested crop (grain and biomass), leaching, erosion and denitrification. These factors are reasonable in measuring the role of Soil Science in presence/future developments in the region. The contribution of Usman and Burt (2013) provided added information on the nutrient inputs in the aspect of animal manure/organic fertilizer. Their study explained the physical and chemical components of 12 different organic materials for soil quality and soil fertility rehabilitation. These organic inputs are product of animal and plant materials available in many regions of sub-Saharan Africa. Farmers used them regularly during annual cropping activities, and also were considered the best resources for the production of quality compost and organic fertilizers (Usman and Kundiri, 2016). Roose (1996) provides a detail coverage of 'land husbandry: components and strategy' which demonstrates key components of mineral outputs. This report improves the awareness of the impact of soil erosion and its dimensional types – mass movement, gully, sheet and their various impact classes, which are all causes of nutrient depletion and major threat to food security.

Land use changes is another area of consideration as these, mostly focused on deforestation, cropland expansion, dryland degradation, urbanization, pasture expansion and agricultural intensification (Lambin *et al.,* 2003). These six factors highlighted by Lambin and co-workers (2003) reveal that Earth's land will continuously face challenges that require huge contribution on environmental management from experts at all levels. Knowledge of Soil Science is in better position to lead this global exercise in achieving food security and a better

**Table 1: The progression of Soil Science from left to right and the possible co-existence of Soil Science Amateurs (after Koppi *et al.,* 2010)**

| Amateurs (non - professionals) | Recent professionals | Early professionals | Amateurs |
|---|---|---|---|
| The study of soil for Utilitarian and survival purposes (over 150 years ago) | The study of soil in its own right; development of methods and analytical procedures; linked to agricultural production | Linking Soil Science with other disciplines and engaging with other scientists, politicians and stakeholders to provide information and solutions to complex environmental issues and problems | Members of the public who engage with Soil Science out of personal interest and enthusiasm for the discipline and its practices |

environment management. Millions of forest land area and other important vegetation zones were decreased due to deforestation, urbanization, cropland expansion and agricultural intensification. Hartemink (2010) reported that the area of cropland has increased from previous record of 300-400 million ha in 1700 to 1500-1800 million ha in 1990 – a situation that has led to the clearing of forests and the transformation of many important natural vegetation areas. This could mean that without proper soil management, the entire global natural vegetation is at risk of losing many vital resources and biodiversity including medicinal plants, timbers, vegetation cover, fauna and flora, and varieties of beautiful forest areas. Obviously, we need to manage and improve the quality and fertility of agricultural landsin order to feed the growing population. This is can be achieved if the right of the soil is recognized and its resources, which are vital for ensuring food security and reducing hunger.

Generally, most of the agricultural lands particularly in the dryland areas of sub-Saharan Africa have been affected by soil degradation and their right of receiving proper management was ignored (Usman *et al.,* 2017). Predicting soil properties through assessment and evaluation of physical, chemical, biological, hydrological, remote sensing and ecological components of soil medium, is an important procedure for ensuring proper soil management and food security (Minasny and Hartemink, 2011). Perhaps, Soil Science has contributed with vital resourced information that transforms and increases food production in many tropical areas of sub-Saharan Africa. However, differences and similarities on how soil science assists agricultural development in the tropical and temperate regions of the world is a question of consideration. Thanks to the work of Hartemink (2002), a resource information that focuses on some key differences and similarities of soil science in the two regions. In his understanding: "the range of conditions under which soils are formed is as diverse in the tropical as in the temperate regions, but soil science has a different history and focus in the two regions". The dimensional role of soil science in the tropics needs to be expanded to increase food security and eliminate hunger. However, a possible option to reverse this development is to itemize the impact of soil science on development in the regions and to develop skills and methodologies of immense benefits to millions of people whose population is around 95% compared with the temperate region (Hartemink, 2002). Therefore, the role of Soil Science is highly needed in the tropics to ensure food security for the growing population.

Soils are back on the global agenda is an idea that shows the need for up-to-date and fine resolution soil information to achieve food security and alleviate poverty (Hartemink, 2008). The dimension of soil in this context can be looked from the perspectives of all components of soil science – soil chemistry, soil physics, soil biology, soil pedology, soil fertility, soil quality, soil management, soil survey, soil conservation, soil hydrology, soil history, soil morphology, soil engineering and soil architecture. Soil science dimension has looked into these components for wide ranges of agriculture and environmental developments over the last 100 years of history (e.g. Hartemink, 2009). The contributions of soil scientists have provided detail overviews of what these components entails (e.g. Kalpage, 1979; Fanning and Fanning, 1989; Lal, 1998; Foth, 1990; Yaalon and Berkowicz, 1997; Jenney, 2009; Soil Survey Staff, 2010; Buol*et al.,* 2011; Usman, 2013; Brady and Weil, 2014). Table 2 presents the summary of the meanings of some of these components and there relevance to achieving food security in presence and future. This entails that the soil science is an innermost discipline with diverse developments (presence and future), which are useful in achieving food security, industrial developments, better rural livelihood, economic stability and socio-cultural advancements (Figure 2).

**Relationship between Soil and Food Security under Demands**

The demand for quality soils is always needed to feed the growing population and reduces hunger (Lal, 1998). However, this demand has been hindered by other human interests, which has created many imbalanced relationships between soil and sustainable food security. Anthropogenic activities are factors, which the soil scientists discussed and considered to be an independent factor in the formation and transformation of soil during $19^{th}$ and $21^{st}$ Century (Bidwell *et al.,* 1965; Dudal *et al.,* 2002). These human activities, affected important components of soil and changed the natural condition of physical, chemical and biological behaviors within the soil medium (Blevin *et al.,* 1983; Buschiazzo *et al.,* 1998). This could means that ensuring achievement of human demands on lands, opens many entrances and crevices that create negative and/ positive relationship between the soils and food security. This statement can be explained under the following concepts:

**Agricultural intensification:** Land intensification through agricultural advancement over the years has affected many aspects of soil and soil components. The genesis and formation of soil parent materials have been changed as a result of practices such as strengthening land forest and vegetation for irrigation, dryland farming and dams (e.g. Buol *et al.,* 2011). For many years, these developments have helped in achieving food security, but at the same time changed soil properties and soil behavior – the result was increase in soil erosion, desertification and contamination (e.g. Zachar, 1982; Warren *et al.,* 2001; Vrieling, 2006).

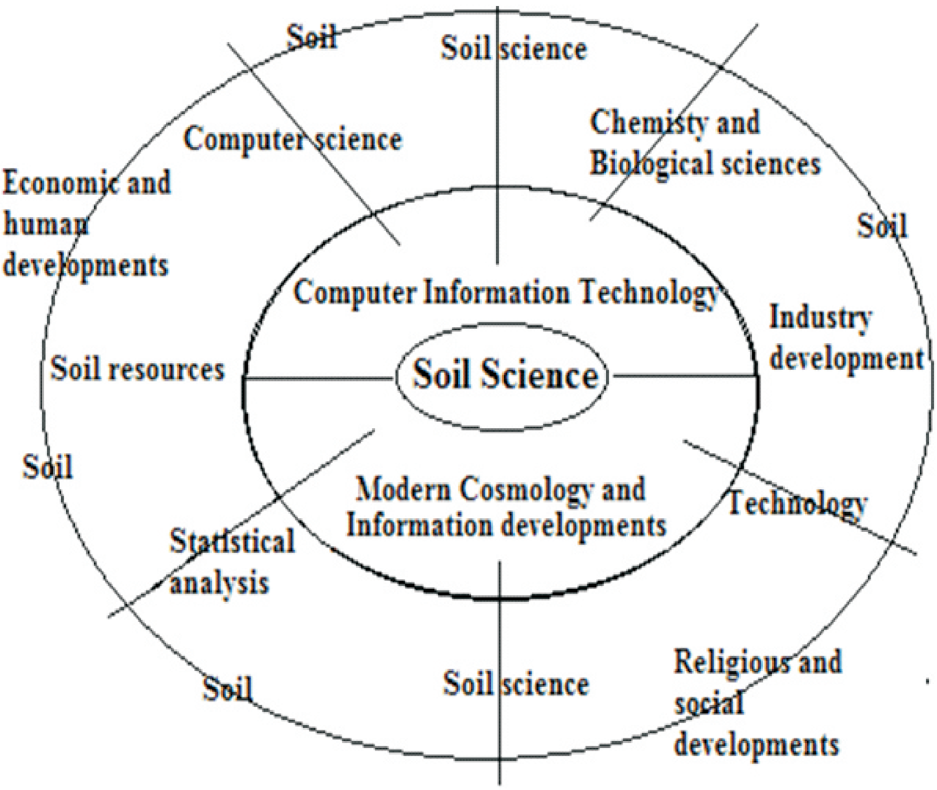
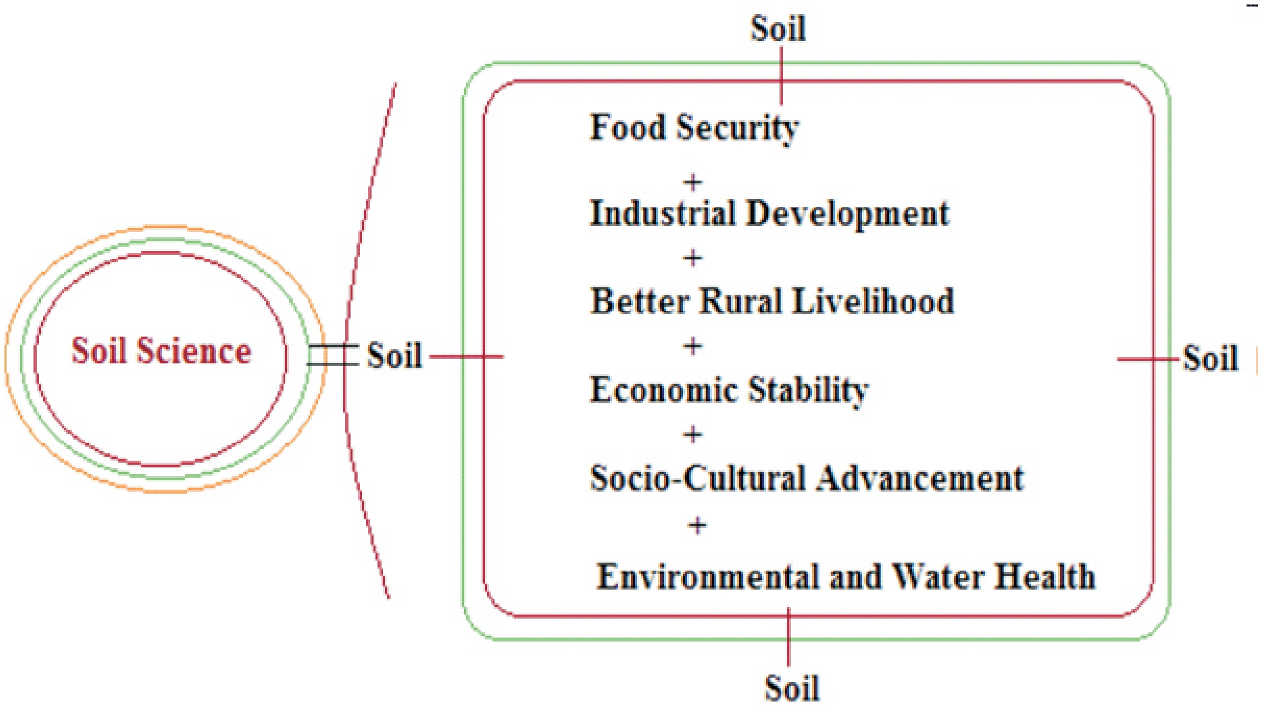



**Figure 1: Linkage between Soil Science and other scientific deciplines (Modified after Usman, 2013)**



| Soil component | Meaning: (e.g. Fanning and Fanning, 1989; Foth, 1990; Buol *et al.,* 2011; Usman, 2013; Brady and Weil, 2014) | Soil Science dimension for food security |
|---|---|---|
| Soil Physic | Soil physical behavior and energy transformation within the soil medium. | Drainage, irrigation and water ways application. |
| Soil Chemistry | The chemical formation, properties and processes taking place in and around the soil medium. | Organic and inorganic fertilizers, organic matter, humus developments. |
| Soil Biology | This refers to the soil biota and biodiversity in soil medium. Soil biota is a general term refers to all soil organisms living and communicating in soil environment – considered the 'biological engine of the earth', driving and transforming physical, chemical, biological and ecological processes in global soils. | Biota and biodiversity, compost and vermicomposting technology. |
| Soil Mineralogy | The primary and secondary soil minerals and their contribution to soil chemistry, soil physics and soil biology as well as their relation to overall soil genesis and soil formation. | Soil quality and soil fertility rehabilitation. |
| Soil Pedology | The soil genesis (weathering of rocks and minerals, factors and processes of soil formation and classification) and classification (systematic rearrangements of soils into groups or categories on the basis of their characteristics). | Management and development of soil profile, root zones and underground water zones. |
| Soil Fertility | The ability of a soil to supply the essential plant nutrients for plant growth. | Maintenance of surface soil layers: O and A horizons. |
| Soil Quality | The capacity of a specific soil to function, 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. | Management and maintenance of soil. physical, chemical and biological properties. |
| Soil Management | Ways to improves, maintains, and protects soil for function, health, quality, and fertility to support plant growth for high crop yield. | Developments of organic fertilizer, inorganic chemical fertilizer and manures |
| Soil Salinity | The excess soluble salts present in the soil and their recovery and soil management for saline agriculture. | Soil pH testing and soil correction factor through integrated soil fertility management exercise |
| Soil Survey | The systematic examination of the soils in the field and laboratory including their description, classification, mapping and interpretation according to their suitability for different management systems. | An improved scientific soil information for irrigation, dryland agricultural intensification, soil quality and soil fertility rehabilitations |

**Table 2: Soil Component, Meaning and Soil Science Dimension for Food Security**

**Population growth:** Increase population is a factor that has led to many environmental changes – positive and negative (Dietz and Veldhuizen, 2004). Pressures on land, vegetation and forest have led to destruction of some important natural ecosystem in struggle to achieve food security, primary dryland farming and irrigation (Usman, 2007). Deforestation, bush burning, land cultivation are factors associated with increase of soil erosion and desertification, these increased because of pressures on land and forest (FAO, 1995). Increase in population coupled with poverty, hunger and lack of awareness among the people in sub-Saharan Africa for example, were considered the major threat to soil changes and soil manipulation (e.g. Bai *et al.,* 2008; Usman, 2013).

**Environmental contamination:** Use of chemical fertilizers, chemical pesticides, herbicides, insecticides, disinfectants, fumigants and other agro-chemicals have led to soil contamination (Miao *et al.,* 2003). This problem, affects biota and biodiversity, changes soil physical properties and soil productivity (Lewis, *et al.,* 1978; Madhun and Freed, 1990). It may also cause many effects to human developments – human health effect, soil mineral effect, water quality effect, fauna and flora effect, ecological effect and animal effect (Kortekamp, 2011).

**Industrial developments:** The result of industrial development, which demands increase of agricultural productions to meet the requirement of their daily/weekly or annual productions, has caused increase pressures on land. This problem has attracted many commercial agricultural farmers as well as rural people to expand land by destroying canopies and vegetation covers. This has affected many components of surface soils – top layers, soil quality and soil developments – the most important aspect of soil in ensuring food security (Usman, 2013; Brady and Weil, 2014).

**Unsustainable political life-style:** Lack of political stability in some part of Africa for example, has affected soil and soil particles in many ways. Many agricultural lands were abundant because of problems associated with political and social crises between one village and another/ community etc. This problem hinders increase food availability in many regions of sub-Saharan Africa (Usman *et al.,* 2017).

**Corruption:** Corruption is a serious problem that hinders achieving sustainable food security in Africa (Usman, 2007). This has also affected the development of agricultural soils in many contexts – unsustainable irrigation projects, poor constructions of dams and irrigation waterways, lack of maintenance culture, lack of good supervisions etc.

**Engineering agendas:** Development of dams and engineering agendas behind it, has affected many important agricultural lands and sustainability of food security in Africa. It is true that this development could leads to an increase of food security under irrigation; however, ensuring quality standard, supervision and good maintenance culture are factors, which must be considered in the process. Ensuring the attainment of these factors is lacking in most of the African nations (Usman *et al.,* 2017).

**Architectural urban developments:** Many important agricultural lands were affected by urban developments. This has reduces the size and dimension of agricultural production activities around the villages and town areas. Soil and soil resources were also affected.

**Government interest and revenue generation:** Land scaling and housing estate development are issues of high concern under ministries of land and housings in many African nations. Government generates a lot of revenues as return in an exchange of lands to the community (Usman and Kundiri, 2016). Yes, this provides opportunities for low income people to own their houses and have better shelter, however, this event affect the dimension and sustainability of agricultural soils around the villages and town.

**Roles of Soil Science in Achieving Food Security**

The demand for requiring about 175 million to 220 million hectares of additional cropland due to population increase (McKinsey Global Institute, 2011), indicates the need to discuss and explain the roles that soil science can play in achieving food security by 2020 in Africa. Requiring the additional cropland cannot be ensured if the potentials to manage and improve agricultural soil quality is missing. Rushemuka *et al.* (2014) noted that in Africa, we must address issues related to high concentrations of poor farmers using poor agronomic tools to work soils dominated by low inherent fertility. However, addressing these issues would provide opportunities for the continent to integrate ideas from professional soil scientists and agronomists with local farmers and observers so that the cropland can be improved and managed in the region. And, this may put the soil science in a position to offer the following roles for sustainable food security in the presence and future.

**1. Food availability:** Soil quality and soil fertility are two important components of soil developments that are vital in ensuring food security (Lal, 1998; Brady and Weil, 2014). When soil is degraded and nutrients depleted, the crop yield must be affected (Hartemink, 2003). Increased food production and high yield depends largely on good and productive soil (Usman, 2013). The practices of soil management in an integrated manner help in the improvement of high and healthy crops (Usman, 2007). Soils must be managed and sustained through Integrated Soil Management Programme (ISMP), the work that requires an improved scientific collaboration from local, national and International communities. Therefore, ensuring food availability to feed the growing population must consider the role of Soil Science in providing and demonstrating important information that could help to improve, maintain and manage soil quality and soil fertility in the global agricultural land scale.

**2. Desert/wasteland transformation:** Agricultural intensification must look into the ways of recognizing the importance of wasteland transformation. Soil science as a leading product can be employed to achieve this technology. Soil science information such as pedology, contamination, drainage, hydrology and fertility are resources, which can be used to transform desert and wasteland into valuable lands for agricultural production (Hartemink, 2006b). This is not only means ensuring food security but also minimizing pressures on global forest and vegetation areas, which are virtually disappearing on the basis of factors such as deforestation, poverty, land uses, desertification and mismanagement (FAO, 1995).

**3. Industrial development (raw materials):** Soil science is reservoir of soil information which can be applied into various components of ecosystems to achieve increase food production and other kinds of industrial materials. However, with developed ideas on future soil science (e.g. Hartemink, 2006a), much can be achieved in the sustainable agricultural developments – high crop yields for food security, forest regeneration for timber, cotton for textile, parent materials such as gravels for road construction and other architectural engineering etc.

**4. Water quality production:** Underground waters are widely used for many economic developments. Majority of the drinkable water industries depend largely on these waters and generate huge amount of monies. Also, many irrigation farms depend on the underground waters for diverse agricultural production, this practice ensured food security in many tropical countries (Ritzema, 1994). It is the role of soil science to ensure the continuous purities and sanitation of underground waters. This can be achieved through assessment and analysis of physical, chemical, biological and hydrological properties of soils under the efforts of: soil pedologists, and soil fertility experts.

**5. Recycling technology:** technology of bioorganic fertilizer can be used as a means of recycling many important organic materials to produce fertilizers (Usman and Kundiri, 2016b). Composting is another alternative of this technology (Misra *et al.,* 2003; Strauss, 2009). These two components of soil quality and soil fertility developments would help to increase food production and opens ways to generate incomes and reduce poverty (Usman, 2018). Therefore, Soil Science is expected to add values in addressing issues such as physical, chemical and biological component of organic fertilizers, which are factors considerable in the development of soil productivity for food security.

**6. Architectural engineering:** Designing good drainage and irrigation water ways is a practice that could help increase food productions in the tropics (Usman, 2007). Soil Science engineers will play a role in achieving this effort. They would provide all the preliminary soil information that can address many environmental issues of high concern during the process. These environmental issues include soil and vegetation reports needed to build and construct drainages, water ways, dams and underground channels.

**7. Educational development:** The role of Soil Science Departments (SSD) and centers in the universities and research institutes is huge. This contribution had help to increase knowledge and awareness on the importance of soil in human economic development for over the years. Many important areas of research interest would generate soil information that could increase food production. These area of research interest may include soil nutrients budgeting, soil erosion assessment, soil quality development, soil water analysis, soil-crop appraisal and soil-land evaluation.

**8. Export improvements:** Increase food security may lead to increase in export of the food products and income generations. Soil Science could ensure this by providing information to improve soil quality and soil productivity in crop production.

**9. Animal production:** When soil and soil environments are managed and sustained in a good manner, pastures and grasses would increase in abundance during the rainy period. Soil science experts in the field of conservation and management practices offer opportunities to increase production of hays, silages, grasses and wide ranges of pastures for animal production. This does not mean only to increase animals for commercial meat industries but also increase jobs among the growing youths.

**10. Urban-rural economic transformation:** Available and affordable foods are signs of economic transformation in the society. Soil Science would provide ways of achieving healthy, available and affordable foods. This can be achieved by ensuring continuous soil quality and soil fertility management through integrated soil management efforts.

## CONCLUSION

More is known about soil and its roles in agricultural production. Despite the soil contributions, the need to better understand the various dimensions of Soil Science and their relevance to the achievement of food security must be canvassed. This is somewhat due to the fact that many aspects of human developments – [architecture, engineering, landscaping, rural-urban expansion, industrial agendas among others] are challenge to agricultural soils. Putting the knowledge of Soil Science into other disciplines of science (e.g. chemistry, biology, physics, geology, geography, information technology etc) is an idea that could help in achieving food availability and better livelihood for the growing population. The role of Soil Science in crop production must consider the values of soil conservation and soil management in ensuring food security and environmental quality. We think that the presence and future role of Soil Science in achieving food security are intense, but efforts and willingness of individualities are required from various components of human resources. Preserving and controlling the true geneses and nature of all agricultural soils plus additional effort to create and expand new sites are means for ensuring food security and food quality. This effort must be ensured at all levels of our economic developments – local, national and international perspectives. Soil and soil resources offered many sustainable economic opportunities in the transformation and improvements of crop production. Agricultural soils needs to be expanded and enlarged through soil and soil resources advancement– the natural resources that supported many industries and human development around the globe. Therefore, the presence and future role of Soil Science in this regard, depend on our capability to cooperate and react in a scientific and professional manner – by working together to achieve all sets of objectives leading to availability of more food in the world.

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