

## Literature Review

### Sustainable Agriculture, the Use of Natural Resources and Food Security in Sub-Saharan Africa

#### **Introduction**

Sub-Saharan Africa is one of the poorest areas of our planet. It attracts the attention of the world community with its numerous problems, such as desertification, degradation of land, poverty, unemployment, social insecurity, wars and revolts, HIV/AIDS rate, and famine. Lack or insecurity of food resources is one of the key issues on the agenda. It is a complex problem dependent on other issues in the region. Many non-governmental organizations, charitable funds and international institutions work to reduce the load on the indigenous population. Moreover, Africa has become a certain test site for various strategies of agricultural and social development. However, a lot depends on local governments and people themselves. Sustainable agriculture is a key to the continental fight on famine.

On the basis of five peer-reviewed articles, this paper will analyze the current situation with food security in different sub-Saharan countries. It will show how different nations in different districts survive and earn their living in agricultural sector, how the lands are used to maximize their utility, what the influence of the interaction of people and nature are, and whether the economical conditions are still as miserable as we traditionally assume.

#### **Bibliography**

The five selected peer-reviewed articles are devoted to the problem of the sustainable use of lands and food security in African countries. Three of them, namely “Subsistence Farming and Economic Hardship in Lesotho, Africa’s Mountain Kingdom” by T. A. Wicle, “An Intensity Analysis of Land-Use and Land-Cover Change in Karatu District, Tanzania: Community Perceptions and Coping Strategies” by Raphael John, Hambati, & Ato Armah, and “A Field

Assessment of Land Use Systems and Soil Properties at Varied Landscape Positions in a Fragile Ecosystem of Mount Elgon, Uganda” by Oyana, Kayendeke, Bamutaze, & Danielson present the results of a field survey of agriculture in different countries and different landscape forms of sub-Saharan Africa. The authors describe the conditions of life of the indigenous population, the way they farm, the way they interact with the environment, and whether their farming is sustainable or not.

Article “Facing Food Insecurity in Africa: Why, after 30 Years of Work in Organic Agriculture, I am Promoting the Use of Synthetic Fertilizers and Herbicides in Small Staple Crop Production” by D. Lotter reflects the experimental knowledge of an organic farmer in Tanzania. The author sums up the result of 30 years of observations and practical experience to discuss the best crops for the sub-Saharan region and the most efficient way of farming. He argues that pure organic farming is not the best solution for the African countries.

The last article, “Food Security and African Agriculture” by N. Vink, offers a comprehensive analysis of the food security issue in African countries. The article proves by numbers that the African continent has all possibilities of becoming sustainable and analyzes the reasons why it is not. The results of the author’s research shatter common perception of Africa as a miserable and agriculturally retarded continent in permanent need of support from the economically advanced countries.

### **Subject Matter**

#### **Field Research in Lesotho**

The pattern of socio-economic situation in all sub-Saharan countries is similar. The population lives on the verge of extreme poverty, urban areas are overpopulated and rural area underpopulated due to the constant labor migration; those who earn their living with agriculture,

live from hand to mouth and have just enough income to go on. However, the level of public consciousness in these countries is different, as well as the level of the governmental involvement into the rational use of land and investing in education and sustainable farming methods.

In the mountain kingdom of Lesotho, 80% of food is imported from other countries. It is a surprising fact because vast majority (three quarters) of the population lives in the rural area. People in small villages live from small-scale animal breeding and vegetable gardens. The territory of the country is strictly divided into highlands and lowlands. The valley is the seat of larger farms, while poorer population with small family farms live on the mountain hillsides with fields up to one hectare large. The ways of farming differ strikingly. While large farms invest in intensive mechanized production, small farmers continue with extensive and labor consuming work. However, even larger farms cannot compete with the South African commercial farms. Small farmers cannot afford mechanization not only because of their low income but also because buying a tractor would be unfeasible for small plots. As the result, while larger farmers contribute to the country's grain stock, smaller farms support just the local communities.

During the past 50 years, Lesotho's population grew almost double. For the increased population in modern conditions, traditional extensive farming does not bring sufficient result. The slash-and-burn method brings devastation of lands. Finally, it is not possible to reach any significant improvement of yields because of the severe degradation of soil. Only 13% of the country's territory is covered by fertile soil. Lesotho's land bears the marks of human activity; it suffers from overgrazing and overcultivation. Additionally, fertile layers of soil run off with showers in the rainy season. The villages can survive from hunting and working on their tiny

farms but the production is just enough to support the needs of the villages and far insufficient to feed 2,2 million people.

Lesotho, in spite of the economic difficulties, stake on education. Surprisingly, in this country where 50% of population are poor and 25% are extremely poor, which means they have less than \$1 a day, literacy rate is among the highest in the African countries. Nevertheless, literacy in utilizing land is still to acquire. Conventional methods of agriculture reduce the fertility and contribute to degradation of soil. Thus, since 1970, the average maize yields reduced from 1400 to 450-500 kg per hectare. Chemical fertilizers to increase the fertility are not affordable for most families, and soil conservation is not practiced consequently.

### **Field Research in Tanzania**

Tanzania is another country with similar problems. It is larger in size than Lesotho, but is as poor. Its landscape also characterized by distinctive highland and lowland areas. Drastic increase of the population means growing consumption demands, which are impossible to meet with traditional methods. Furthermore, not only the conventional methods of farming fail to produce higher yields, but they also exhaust the soil. Increased demands and expansion to new lands in the traditional farming lead to overcultivation. Extensive farming under such conditions does not let the nature recuperate. In semi-arid Tanzania, extensive farming causes severe degradation of soil, desertification, deforestation, change of the grass cover, and extinction of some species of flora and fauna.

In their research of the land-use and land-cover change, Raphael John, Hambati, and Ato Armah come to the conclusion about inconsistency of traditional soil conservation methods. Moreover, they argue that in spite of the obvious anthropogenic influence on the landscape and the quality of soil, it is difficult to define, which of the changes are caused by human activity and

which occur in the natural course of changes. Nevertheless, they also notice considerable slowing of the process of the land-use and land-cover change in the recent decade. This improvement is evidently connected with raised concern about conservation of soil and public awareness of the problem. Tanzania is a country where various soil conservation methods are tested along with various agricultural methods. The authors notice that the condition of soil directly depends on the land management policy applied in the district. For instance, the research doubts the efficiency of prohibiting hunting as a consumptive practice, as it was a traditional form of interaction between the human and nature. At the same time, limitation of the human expansion is beneficial for nature and soil in particular. Sustainability is providing for the needs without exhausting the resources. In this way, Tanzania shows some progress towards sustainability in its agricultural sector. The authors conclude that intensification and modernization of agriculture together with efficient land management practice will increase the yields of crops, reduce the loss of lands, and help to recover soil fertility.

### **Observations on Organic Farming in Tanzania**

Don Lotter, a farmer who devoted thirty years of his life to growing organic food in Tanzania, published the results of his observation and experience. He notes that soil quality in Tanzania increasingly deteriorates. The soil degradation hits the farmer with drastic fall of yields per hectare, like it is in Lesotho. There are several reasons to it, among them conventional agricultural methods failing in new conditions and conversion to monocrops that bring money to the country budget when exported. Lotter states that indigenous African crops, such as sorghum and millet, are much more useful for the soil. However, the benefit for the soil often turns to be a loss for the farmer, for the productivity and price of sorghum and millet are power than of maize. Additionally, even the results of maize could be double from the current average.

The soil that is poor in nutrients cannot produce corn of satisfactory quality. The amount grown is insufficient either. Although people do not starve to death in the areas not affected by war, they are permanently underfed and undernourished. The organism that does not receive enough food of high nutritional value develops different illnesses and is particularly susceptible to such diseases as malaria, tuberculosis, or typhoid. The death rate in Tanzania “would be considered catastrophic in developed countries”, and infectious diseases are a frequent cause of death.

Lotter’s main thesis is that pure organic farming despite all its merits will not be able to meet the growing needs of the country. Although it is possible to make it profitable for the farmers, it takes an organic farm 5-7 years to become feasible. Besides, organic farming demands greater skill and resources, as well as scarce land.

The author recommends controlled use of synthetic fertilizer at the rate of 60 kg of Nitrogen per hectare to provide the plants with necessary nutrients and glyphosate as a herbicide for efficient destruction of weeds before seeding with minimum risk of penetration into underground waters or influence on the subsequent crop. Under the threat of food insecurity in Tanzania, as well as on the larger part of the African continent, such practice is justifiable and its benefits outweigh the presumable damage.

### **Field Research in Uganda**

The field study of the land use systems and soil properties on Mount Elgon in Uganda conducted by Oyana, Kayendeke, Bamutaze, and Danielson showed a similar pattern of interaction of anthropogenic and natural factors. The mountain ecosystem under review is characterized by variety of geomorphologic forms and dense population.. Therefore, it is very fragile and sensitive to any influence. The most evident result is losing the biodiversity. The

quality of soil also deteriorates because of overcultivation and erosion. In addition to that, the wood-covered area significantly reduced because of excessive felling and clearing areas for farms. Conversion of wetlands into farms is another human interference in the mount ecosystem. On the total, small-scale farms take up to 47% of the territory.

Agricultural production on Mount Elgon is classified as montane system dominated by bananas and coffee. The farmers practice two systems of cropping, annual and perennial. While perennial system refers to bananas and coffee, the annual crops are maize, cassava, beans, millet, pineapples, groundnuts, and potatoes. Farmers mostly apply intercropping which means combining several crops on the same field. Soils along the river banks are good for growing vegetables.

Degradation of soil and the change of the land use and land cover under demographic pressure are observed in Uganda as everywhere in sub-Saharan Africa. However, Uganda implements some measures aimed at avoiding further deterioration. Intercropping practiced by most farmsteads prevents exhaustion of soil. Some farmers implement zero grazing to provide for the livestock in an environmentally friendly mode. Generally, the pattern of the animal rearing system allows providing animals with fresh grass, elephant grass, crop residues, silage and animal protein within a small farm unit. Uganda farmers apply such methods of soil conservation as “mulching, hedgerows, mixed cropping of cereals with legumes, intercropping, fallowing, and minimum tillage. Generally, a few farmers practiced agro-forestry and other soil conservation practices, but strip cropping was minimally practiced”.

### **Food Security and African Agriculture**

Contrary to the widespread opinion and despite the situation with food security in separate countries, the African continent is able to provide for its needs. Availability of food is

characterized by pro person agricultural production which has significantly improved in recent decades. Agricultural import that had been steadily growing showed a contrary tendency in 2008. Farming in stable areas where war actions do not hamper normal working conditions has good prospects.

Productivity can be achieved in several ways: by extension, by rearranging crop location and structure, by switching from high-input crops to low-input ones, and by intensification. While extension is not possible and undesirable in African conditions, the other three ways work to develop the Agricultural sector. In South Africa, for instance, farmers reached significant success due to rearrangement of maize plantations and adoption of new technologies, in particular genetically modified maize. “wheat production in Africa has grown from 5 million tonnes in 1961 to 21.5 million tonnes on average for 2007–2009.<sup>25</sup> The same is true for maize output, which grew from 16 million tonnes in 1961 to an average of almost 55 million tonnes in 2007–2009”.

However, food security is no longer just saturation of the market with sufficient amount of food. It goes about accessibility of food, which is not possible to provide in the zones of military conflicts. Additionally, in many cases, it is problematic in Africa to organize supply chain and logistics. Sometimes, it is cheaper to deliver food to coastal urban areas from abroad than to organize delivery from remote inland farms. Without diminishing the significance of the small farmers, Vink points out that large farms have better financing possibilities and better access to markets and technologies than small farmers.

Another aspect of food security is the nutritional value of the agricultural produce. While the amount of food produced in African countries can be satisfactory, it is low-calorie, poor in vitamins and microelements. Besides, nutrition depends on the availability and quality of

drinking water as well. Bad nutrition results in health problems of the local population. As Don Lotter noticed in the previous article, poor soil cannot produce rich food. This is still a problem to solve.

### **Conclusion**

The analysis of the articles suggests that traditional methods of agriculture are similar throughout most sub-Saharan countries. Climatic conditions can vary, but spoken about arid, semi-arid and mountainous areas with poor flora and periods of droughts and heavy rainfalls, there are countries more self-supporting, as Uganda and dependent on imported foodstuffs as Lesotho. Tanzania steadily becomes more sustainable. The observation lets suggest that the food security in these countries directly depends upon land management and applied agricultural techniques. In its turn, efficient and environmentally friendly farming depends upon the level of farmers' awareness and consciousness as well as upon the involvement of the government that spreads knowledge among the farmers and supports sustainable practices.

Experimental farming and testing of various conservation methods enable increasing productivity and finding the most efficient and sustainable ways of farming. Food security is a complex issue that does not depend upon farming alone. It needs stability, favorable climatic conditions, development of infrastructure and logistics. In its turn, it is a key issue for healthcare and stability, for food insecurity influences individuals, governments and country borders. However, Africa has a good agricultural potential to become self-supportive and break the rooted stereotype.