

LINKS BETWEEN SOIL MANAGEMENT AND FOOD SECURITY IN WEST AFRICA

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African Agricultural and Food Security Situation

- African countries generally depend on Agriculture as source of food and income. Despite the potential to increase agricultural production, the performance has been abysmally low. The African Union Commissions Food Security Report (2005) reported that African annual growth rate of food production is lower than the population growth rate and this has led to high levels of food insecurity. The same report estimates that African agricultural production has to increase by at least four to six percent per annum on a sustained basis to meet the food needs of the African population that is expected to increase from about 0.90 billion in 2005 to 1.26 billion in the year 2020.

- Interventions to reverse declining trends in food security must take into account the variable resilience and sensitivity of African soils (Stocking, 2003). Also, according to Stocking (2003), in most agro-ecosystems, declining crop yield is exponentially related to loss of soil quality. The study of Oldeman et al. ((1991) shows that soils on about 5 million of land in Africa especially in West Africa are degraded to a point where their biotic functions have been totally damaged and resilience brought to a level that reversing the degradation to restore their productivity becomes uneconomical.

- According to Lal., R. (2009), soil degradation has negative impact on human nutrition and health through its adverse effects on quantity and quality of food production. Eswaran et al., (1996) reported a shocking decline in the rate of food production in West Africa over the last two decades and attributed the decline largely to the rapid decline in soil quality/productivity.

Agro-Ecological Conditions

- Globally, about 16% of Africa's land is considered high quality, 13% as medium quality, 16% of low potential, whereas 55% of the land is unsuitable for cultivated agriculture but supports nomadic grazing. About 900 million ha of high and medium quality soils support 400 million people or about 45% of the African population; about 30% of the population (or about 250 million) are living or are dependent on the low potential land resources. Numerous studies have shown that soil nutrient balances of most African soils are negative indicating that farmers continue to mine the soil.

- In most of West Africa; soils are found to be of medium to high potentials. There is no class one soil and class two soils account for 5.5% of the total land area. Class three soils constitute 46.5% and they are of medium productivity and have a good potential for agricultural development. Over 48% fall into classes four and five and they generally have low productivity.

Soil management issues that militate against high crop yields are:

- Soil erosion,
- Salinization,
- Flooding,
- Decline in organic matter and soil biological activity,
- Degradation of soil structure and loss of other soil physical properties,
- Loss of soil chemical qualities,
- High toxicity as a result of acidification or environmental pollution,
- Deforestation and overgrazing,
- Mismanagement and misuse.

Table 1: Classes of nutrient loss rate for SSA (kg/ha per year)

CLASS	N	P ₂ O ₅	K ₂ O
Low	<10	<4	<10
Moderate	10 – 20	4 – 7	10 – 20
High	21 – 40	8 – 15	21 – 40
Very high	>40	>15	>40

Source: Stoorvogel and Smalling, 1990

Table 2: West African Countries Classified by Nutrient Depletion Rate

Low	Moderate	High
Chad	Benin	Cote d'Ivoire
Guinea	Burkina Faso	Ghana
Mali	Cameroon	Nigeria
	Gambia	
	Liberia	
	Niger	
	Senegal	
	Sierra Leone	
	Togo	

Source: Stoorvogel and Smalling, 1990

The Links between Soil Management and Food Security

- The link between soil management and food security in West Africa can be seen in the fact that poor soil management leads to low agricultural productivity, since agricultural productivity is fundamentally affected by the productivity status of the soil.
- To better appreciate this link, changes in crop yields measured over several decades reflect changes in soil conditions and management strategies.
- There are many success stories of the positive relationship between better soil management and crop yields which translates to improved food security in Nigeria, Mali, Ghana, Burkina Faso, Niger, Chad etc.

Strategies

Strategies that can improve the productivity of West African Soils in support of food security include:

- Improving water productivity,
- Enhancing soil fertility and micronutrient availability,
- Adopting no-till farming and conservation agriculture and
- Adapting to climate change

There are also new innovation such as;

- using remote sensing of plant nutritional stresses for targeted interventions,
- applying zeolites and nanoenhanced fertilizers and delivery systems,
- improving biological nitrogen fixation and mycorrhizal inoculation,
- conserving and recycling (e.g. waste water) water using drip/sub-drip irrigation etc.

Conclusion

- Judiciously managed and properly restored West Africa soils have the capacity to grow adequate and nutritious food for present and future populations (Lal, 2009).