Appraisal of the state of affairs in Africa – how is agriculture in the continent impacting land and other resources and how is it dealing with the problem of desertification.

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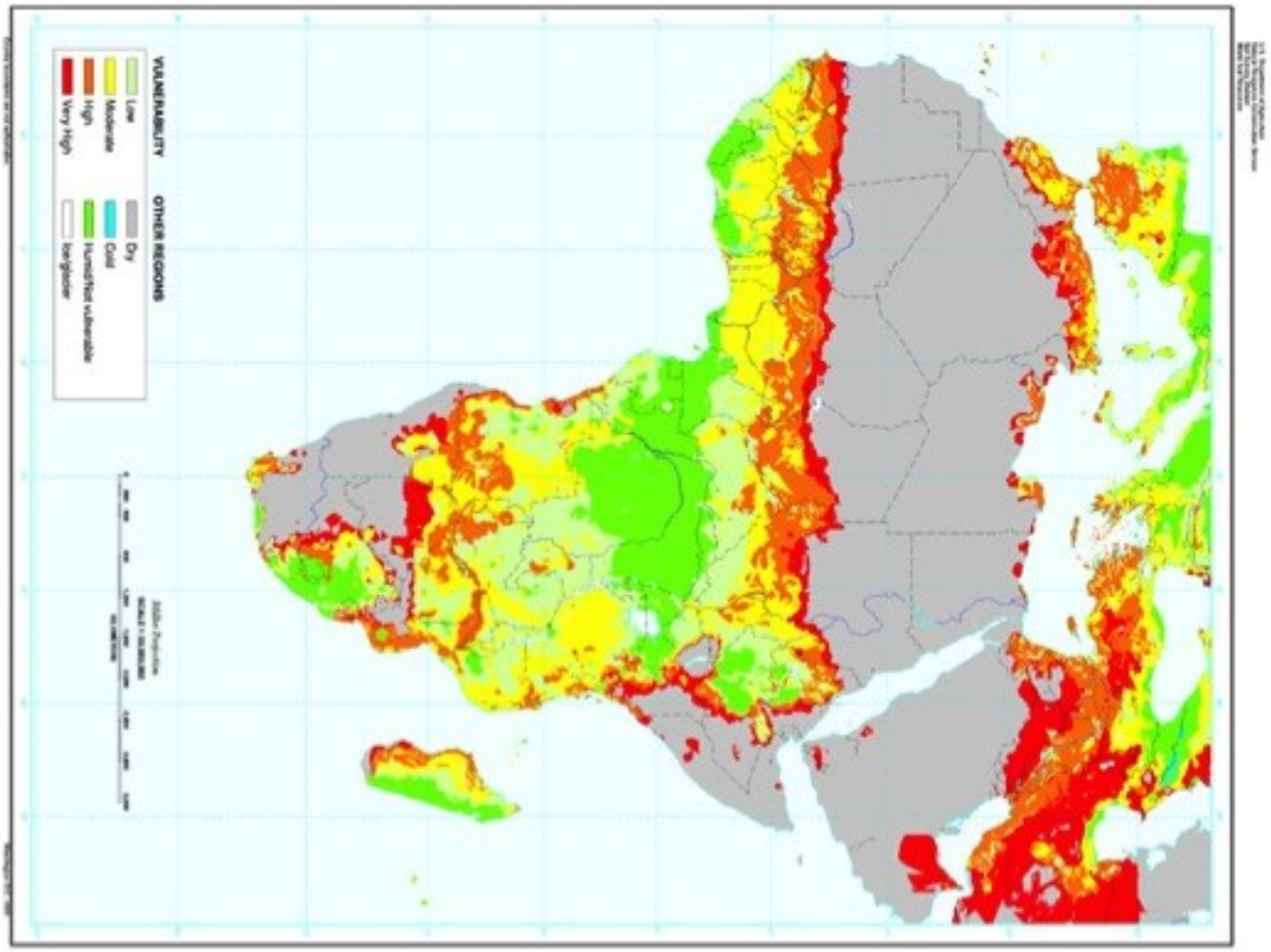
Agriculture in Africa

Land

Land, sometimes referred to as dry land, is the solid surface of Earth that is not permanently covered by water.
- characteristics

Figure 2. Desertification vulnerability of Africa



Aridity index map (More than 25 percent of Africa is desert.)

Aridity Index less than 0.65 (Dryland). Aridity is a measure of 'dryness' of the climate expressed as the ratio of precipitation to evapotranspiration; the lower the ratio the drier the climate

Water scarcity Map for Africa

Total water withdrawal is > 40 % of the total surface water plus groundwater available (per year). Total water withdrawals refer to water use from the agriculture, domestic, and industrial sectors. Water stress is a measure for chronic human induced stress, rather than drought stress

Decreasing productivity of the land

Severe or Moderate decline in land productivity. Classes 1-3 in the land productivity dynamics map (LPD). Land productivity, here calculated as the annual growing season accumulation of the above ground biomass production is a proxy for NPP. The dynamics, observed by satellite and derived from phenological analyses of a 15-year time series (1999-2013), point to long term alterations of the health and productive capacity of the land.

Irrigation

Irrigation occurs > 10 % of grid cell. Area equipped for irrigation, expressed as percent of total 10 × 10 km area. Obtained by combining sub-national irrigation statistics with geospatial and satellite information on the position and extend of irrigation schemes. This layer does not map the area that is actually irrigated.

Climate vegetation trends

Below-average biomass productivity due to drought conditions. Decline in annual plant biomass productivity (as derived from Fraction of Absorbed Photosynthetically Active Radiation –fAPAR) due to drought conditions (here, based on negative deviations from the 1901-2010 average Standardized Precipitation and Evaporation Index). Expresses the response of plant productivity to climate fluctuations.

Forest loss

Decline in tree cover, if observed in any 30 m^2 pixel contained within each 1 km^2 pixel. The change in tree cover is derived from satellite observations at 30 m resolution (per year).

When resources are degraded, we start competing for them. [...] So one way to promote peace is to promote sustainable management and equitable distribution of resources.

Wangari Maathai!

Agriculture

Agriculture is the science and art of cultivating plants and livestock.

- Characteristics

Low input Agriculture map (crop)

Nitrogen deficit exists. Calculated based on the N balance level remained below the first quantile. The nitrogen balance indicates the level at which the crop(s) uses the applied nitrogen according to local conditions. Values in the first quantile mean that there is less nitrogen than the crop needs. (quantiles are calculated per broad land class).

poor resource exploitation practices

impacts on the environment

Negative impacts include:

- Conversion of forests, grasslands and other habitats for agricultural use

Degradation of soil quality (20 per cent of African soils are seriously degraded)

Declining diversity

Wild food resources (seeds, leaves, roots, wild animals) harvested in agricultural and forested areas can provide important food reserves, particularly for vulnerable groups such as women and children. Often, selling such resources can yield a better income than local wage labour.

Low input traditional systems however have an advantage of

agriculturalists are also the custodians of much of the world's rural landscapes and of the biodiversity represented by hundreds of thousands of crop and livestock varieties. Agricultural systems, both modern and traditional, that rely on ecosystem management rather than the external inputs of intensive farming can sustain the environment.

African polyculture systems — which grow a variety of different crops on the same piece of land — are a case in point. They are used in at least 80 per cent of the cultivated area of West Africa, and are often highly bio diverse. As a result, they can be a way of conserving valuable crop and livestock diversity as well as effectively suppressing pests and boosting nutritional values.

As part of the living environment, agricultural biodiversity plays key roles in: decomposition and nutrient cycling; natural pest control; soil conservation; pollination and seed dispersal; local and global climate; the water cycle; and biomass production.

What is being done

Poor farmers can more than double their yields and raise their incomes by adopting resource-conserving practices.

On average, farmers increased their yields by 9 per cent.

Elements of sustainable agriculture include: next slides

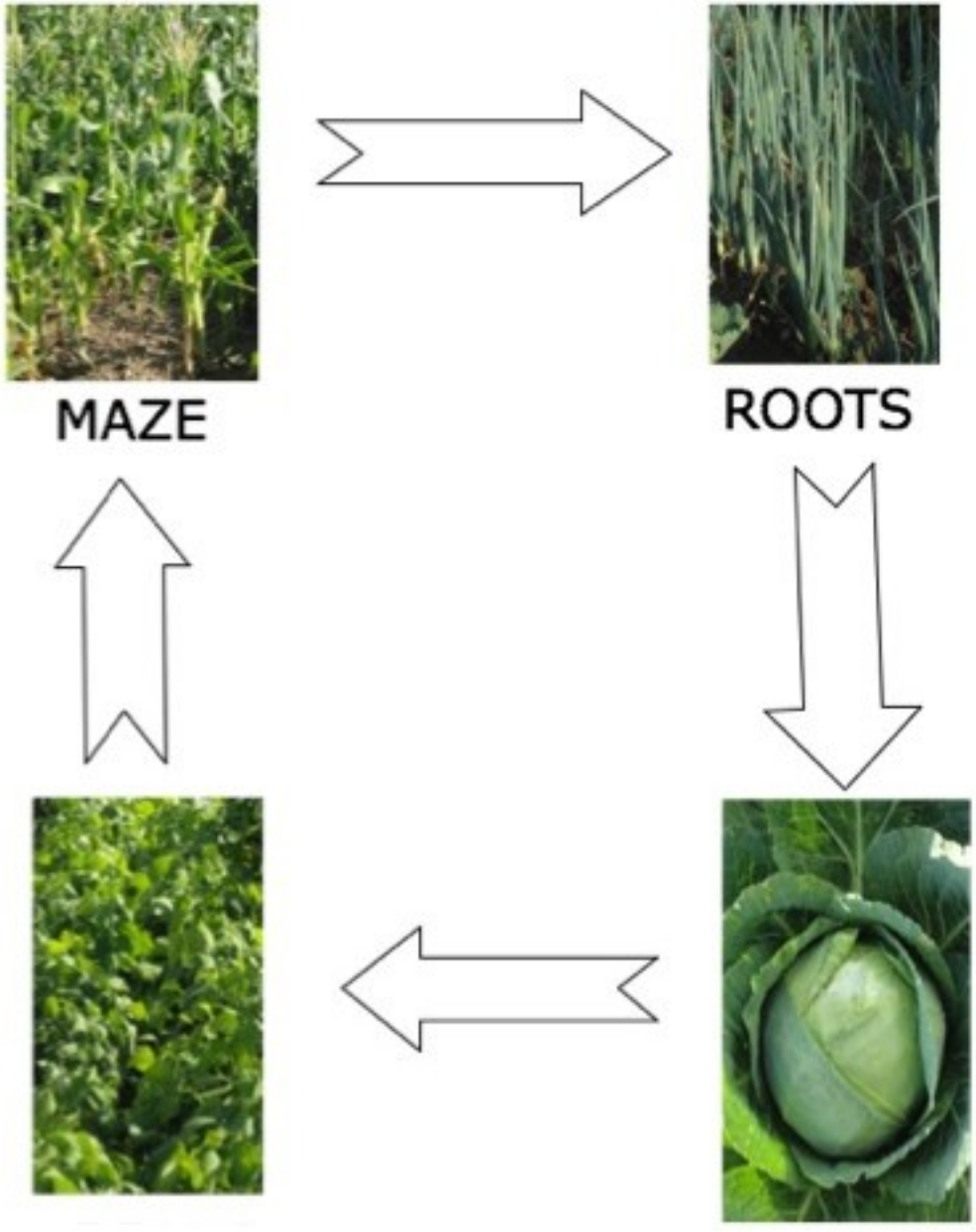
Combined heads of state effort

The Great Green Wall aims to become a 15 km wide and 8,000 km long plant barrier along the Sahel. covering 100 million hectares of semi-desert with a green mantle.

Target reduced to a realistic 200,000 hectares per year.

African Union 2007

Rotating crops to increase soil fertility



http://moofafrica.com/wp-content/uploads/2013/02/crop-rotation.png

Growing "cover" crops along with main crops to reduce water runoff

Corn belt south Africa

Integrated pest management — which favours ecological pest control over pesticide spraying

Promotion of post-harvest disinfestation treatment in Kenya and Uganda: Facilitation of market access for mango, avocado, French bean and bell pepper (2019)

The use of livestock manure for fertilizer

Planting legumes, which boost nitrogen levels in the soil

Using windbreaks and contour farming with appropriate borders to conserve soils and water

Breaking the soil only where seeds are to be planted, because ploughing entire fields can degrade soil and lead to erosion.

Landscape Restoration and Integrated Water Resources Managemen, 20th June 2019 in Rubavu District.

High input agriculture map (crop)

Nitrogen surplus exists. Calculated based on the N balance level remained above the fourth quantile. The nitrogen balance indicates the level at which the crop(s) uses the applied nitrogen according to local conditions. Values in the fourth quantile mean that there is more nitrogen than the crop needs. (quantiles are calculated per broad land class)

Agricultural intensification, with its emphasis on commodity crops, often erodes these resources by promoting improved crop varieties and monocultures and increasing the use
of pesticides, which can kill wild food resources.

In the process, indigenous knowledge on the use of wild foods, and agricultural practices important for preserving biodiversity, can be lost.

Indigenous knowledge is often extensive: the agropastoral Tswana of Botswana, for instance, can easily respond to shifts in the abundance of local food sources because of their vast knowledge of local plant and animal food sources — they consume 12 plant and 100 animal species

Pollution of soil and surface water, aquifers and coastal wetlands through excessive or inappropriate use of pesticides and fertilizers

Significant loss of crop and livestock genetic diversity through the spread of industrial monocultures, reducing resilience in the face of climate and other changes (durum wheat is being lost in Ethiopia)

The energy required for irrigation, farm machinery and the production of fertiliser results in large greenhouse gas emissions, which contribute to climate change.

Competition for water
dryland Africa where land is used for growing vegetables and other export crops that rely on irrigation for their production.

Livestock density

Livestock density > class median. Livestock is calculated in terms of livestock 'units' (LSU). This allows to accumulate the various types of livestock (cattle equal 0.8 LSU, sheep 0.1, goats 0.1, pigs 0.4, chicken 0.01LSU). The layer is compiled with the 2007 FAO GLW data that is improved with current statistics and the use of higher resolution predictor variables. The density of livestock is related to environmental pressures from livestock related land use change, grazing lands and fodder production, and greenhouse gas emissions. Within the broad land classes an additional subdivision between dryland and non-dryland was introduced for calculating the GCI thresholds.

Overgrazing and overstocking

Irish Aid has invested in ‘seed banks’.

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. The seeds the banks conserve are likely to play a critical role in recovering from future natural and manmade disasters.

emerging research gaps:

- There is lack of well-documented, comparable, time series of key indicators for many ecosystem features that increase the knowledge of condition and trends on land degradation in the Sahel.

- The different scales used by both remote sensing specialists and botanists on the ground deliver inconsistent messages on land degradation and recovery

- After many decades of remote sensing application in the Sahel, capacities are still limited for a rigorous and consistent monitoring of land use and land cover change.

- Information on land degradation in drylands is still poor due to scarcity of data, and this limits the ability to assess consistent baseline of the state of land degradation and desertification.

- Not enough attempts for long-term field based survey of land dynamics have been made. Existing surveys are limited to Mali, Niger and Senegal.

- Local perceptions of land degradation and improvements often conflict with earth observation analysis, calling for the need for more interdisciplinary studies

- There are no satellite images available for periods between 1976-1983 and 1989-1998 when major droughts occurred.

improvements to adequately assess quality and develop a consistent message on the magnitude of land degradation.

- harmonization of time-series data,
- promotion of knowledge networks,
- enhancement of access to data,
- filling data gaps, agreement on scales and assumptions,
- set-up of a denser network of long-term field surveys,
- consideration of local perceptions and social dynamics.

References

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World Desertification Atlas 2019

Thank you for listening to me