Managing Living Soils Workshop

Status and Priorities of Soil Management in Kenya

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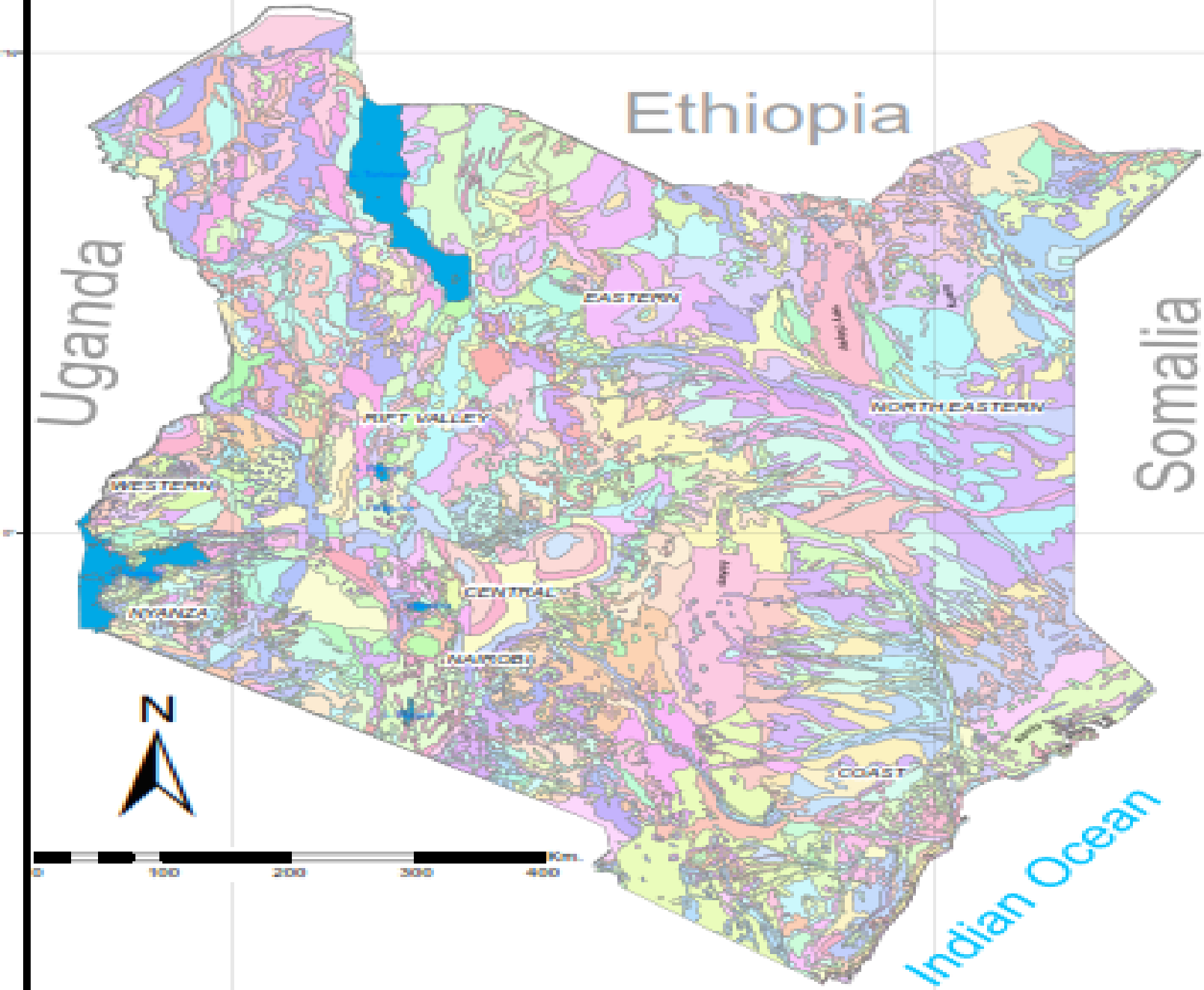
Background Information:

- Kenya has a population of approximately 40 M and lies between latitudes 4° N and 4° S and between longitudes 34° E and 42° E.
- It is bordered by Tanzania to the south, Uganda to the west, Ethiopia to the north, Sudan to the north-west, Somalia to the east, and the Indian Ocean to the south-east.
- Its area is approximately 584,000 km^2

Background info cont..

- The country has climatic and ecological extremes with altitude varying from sea level to over 5000 m in the highlands.
- The mean annual rainfall ranges from < 250 mm in semi-arid and arid areas to > 2000 mm in high potential areas.
- Soils vary from the coral types on the coast to alluvial, swampy, and black cotton soils along river valleys and plains.


Ethiopia
Uganda
Somalia
Indian Ocean
EASTERN
NORTH EASTERN
RIFT VALLEY
WESTERN
NYANZA
CENTRAL
NAIROBI
COAST
N
0
100
200
300
400
Km
Compiled by: Joseph N Mabere

Background info cont…

- The Kenyan highlands have fertile volcanic soils whereas soils in the semi-arid regions are shallow and infertile. Such diversity in climatic and edaphic conditions has encouraged the evolution of a wide variation in plant genetic resources.
- Agriculture is very important in Kenya as 75% of the Kenyan populations are dependent on agriculture for food and income, and it contributes 26% to the Gross Domestic Product (GDP) and 60% to foreign exchange earnings.
- However, only about one third of the total land area of Kenya is agriculturally productive, including the Kenyan highlands, coastal plains and the lake region. The other two thirds of the land area is semi-arid to arid and characterized by low, unreliable and poorly distributed rainfall. These areas are used for pastoral farming.

Soil Properties

- In most parts of Kenya, soils are deficient in nitrogen (N), phosphorous (P) and occasionally potassium (K). In dry areas, the soils have low organic matter mainly because rainfall is low, variable, unreliable and, poorly distributed.
- Soil distribution of Kenya is divided into the following broad regions: Humid, Sub-humid, and Arid.

Soil Properties

Humid regions (The highlands)

- These are areas with an altitude of over 1500 m which receive an annual rainfall of over 1000 mm. They have volcanic rocks and the soils are mainly loamy (highlands of east and west of the Rift Valley
- Alluvial soils (silts) are found along river valleys.
- Sand dunes and mangrove swamps are found along the coast.
- Soils covered by mangrove swamps are deep, grey, saline and poorly drained

Humid Regions Lowlands: <1500mm

- Have sandy soils which are well drained and are of loamy, sandy clay texture e.g. along the Kenyan coast. The Taita Hills have fertile loam soils which are agriculturally productive

Soil Properties cont...

Sub-Humid Region (Lake and Western Kenya)

- These areas receive slightly less rainfall than the humid areas.
- They have volcanic and basement rocks.
- Lie between 1000 to 2000 m. Rainfall is up to 1,000 mm per year and soils are red clay.
- Areas with sedimentary rocks occur in the lowlands at an altitude ranging from 1,000 m and have loamy sandy soils.
- Soils here vary greatly according to the prevailing parent material.
- Volcanic soils interspersed with fertile peat swampy soils are found in the uplands. Soils in these regions are generally productive.

Soil properties cont..

Semi-arid regions (Northern and North-Eastern Kenya)

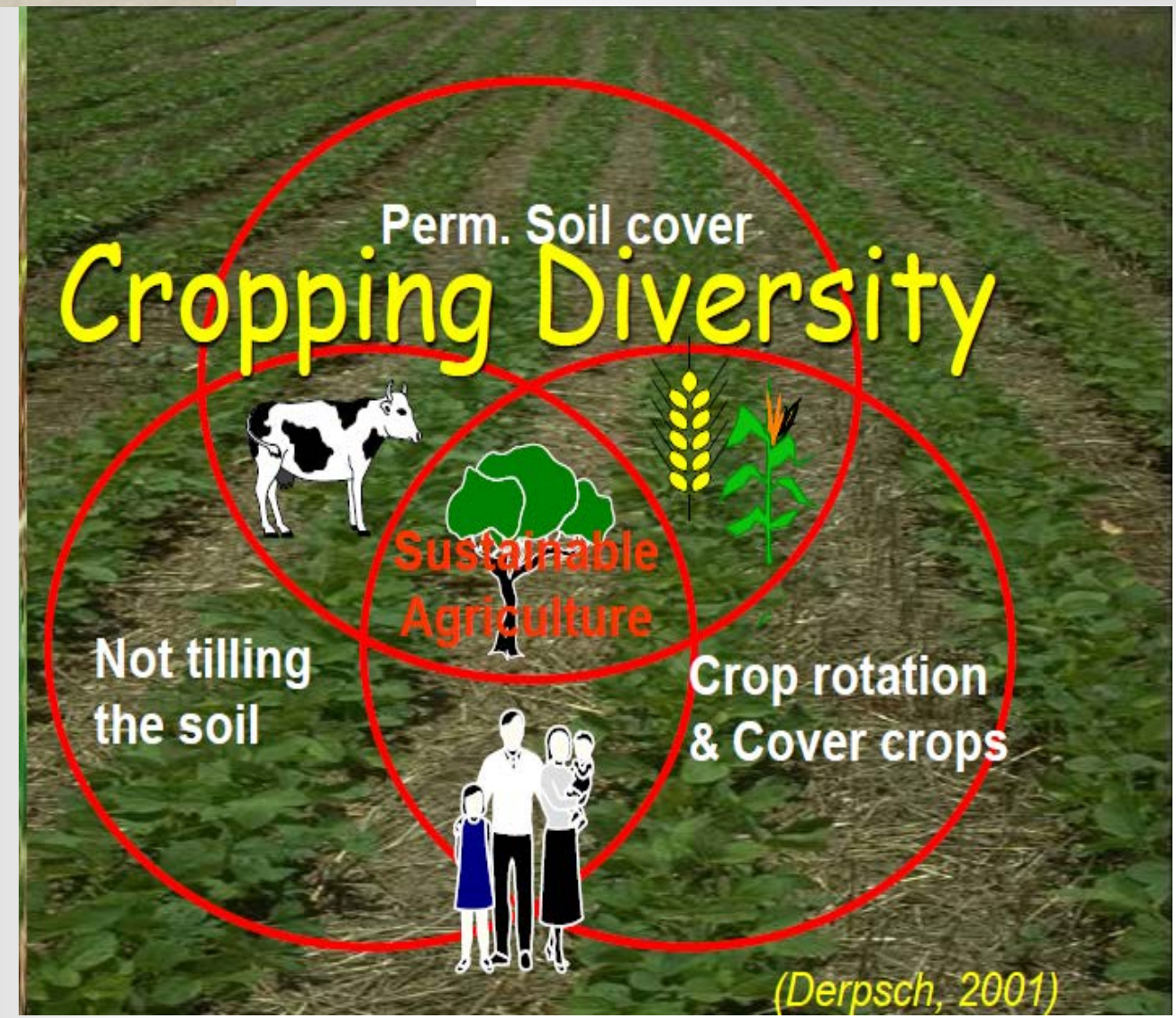
- These regions receive on average 300-500 mm of rainfall per year and the soils are shallow and generally infertile, but variable.
- These soils have developed mainly from sedimentary rocks.
- Areas with an altitude above 1,200m and receiving rainfall of up to 600
- Black cotton soils are found in the north-east of Kenya. These soils becomes water-logged when it rains.
- In north-western Kenya, and to the east of Lake Turkana, there are lava soils. These areas receive less than 250 mm of rainfall per year and soils are not fully developed because they lack vegetation or organic matter.

Priorities of Soil Management-Kenya

Low soil fertility is a major factor limiting smallholder farming in Kenya.

- Use of Organic Manure in combination with Inorganic Fertilizers (AGRA soil health programmes)
  - Crop Diversification – mixed/inter cropping
- Promotion of water & soil management measures
  - Water harvesting & supplementary irrigation
  - Green house farming
  - ISFM Programmes (KARI, MoA, Tropical Soil Biology and Fertility Institute (TSBF)
  - Contour and Conservation Agriculture farming
  - Agroforestry (VI-AFP and ICRAF) in Western Kenya

Introduction of Conservation Agriculture?



Three principles

- **Minimum soil disturbance – or direct seeding if possible**
- **Permanent soil cover**
- **Crop and cover crop associations and rotations**

Maximum and sustainable benefits derived where the 3 principles overlap

Conservation Agriculture:

- CA enhances sustainable soil improvements – biodiversity, organic matter – which are building blocks for non-extractive use of the natural resource base
- CA enhances an increase in soil organic matter (SOM) – which is core for more efficient use of water.
  - With 1.5 to 2% OM, soil can hold 16-20 kg of water.
  - The water capacity increases to 87 kg when OM increases to 4-5%. (Jill Clapperton, 2009).
- Minimise soil erosion
- Reduce soil compaction and plough pans

CA is needed now, in …

Adapting to climate change

- Tillage accelerates decomposition of soil and soil surface organic matter into CO_2. No till reduces CO_2. emissions
- CA fosters: carbon sequestration, maintenance of hydrological cycle and biological pest control
- Although smaller amounts of carbon can be sequestered per hectare (0.05 – 0.2 metric tons $ha^{-1}yr^{-1}$), with millions of farmers practising, benefits are huge.

BURNING = PLOUGHING

Challenges of Soil Management
Rehabilitation of destroyed Land

Partnership and Collaboration

A number of Institutions (Agriculture and NRM sector)

- Government: Ministry of Agriculture and Environment
- Research Institutions: KARI
- Kenya Soil Survey department (KSS)
- UN: FAO, UNEP
- CGIAR
- NGOs and Private Sector

KSS: Responsible for conducting inventories and research on land resources (soils, vegetation, land use, climate, land degradation, among others) throughout the country to provide biophysical information required for multipurpose and specific land use planning.

Challenges: No clear coordination mechanisms among partners in the country and it not easy to access soil information in the country

Soil Policy Development-Kenya

A number of Policy and bills are under preparation, of important is the:

Fertilizers and Soil Fertility Policy:

i) Development of a Sessional Paper On Soil fertility

ii) Draft Bill on Fertilizers & Soil Conditioners

AIM: Regulation of the importation, exportation, manufacture and sale of fertilizers and soil conditioners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