The status of soil resources, needs and priorities towards sustainable soil management in Kenya

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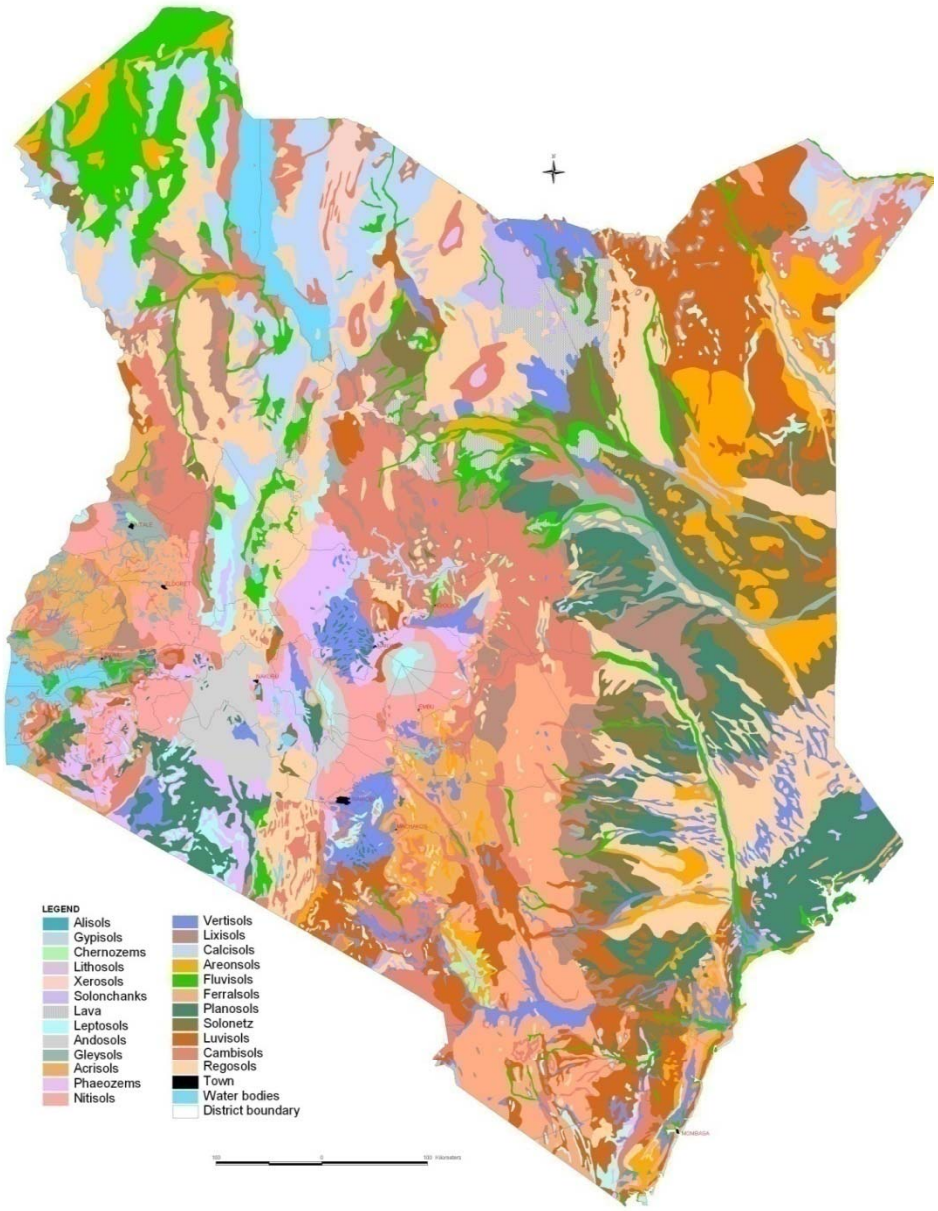
Distribution of major soils in Kenya



- Kenya has 25 major soil types
- Top 10 dominant soil types (% coverage):

1. Regosols (15.04)
2. Cambisols (11.02)
3. Luvisols (8.13)
4. Solonetz (6.36)
5. Planosols (6.33)
6. Ferralsols (6.05)
7. Fluvisols (6.02)
8. Arenosols (5.49)
9. Calcisols (5.46)
10. Lixisols (5.15)

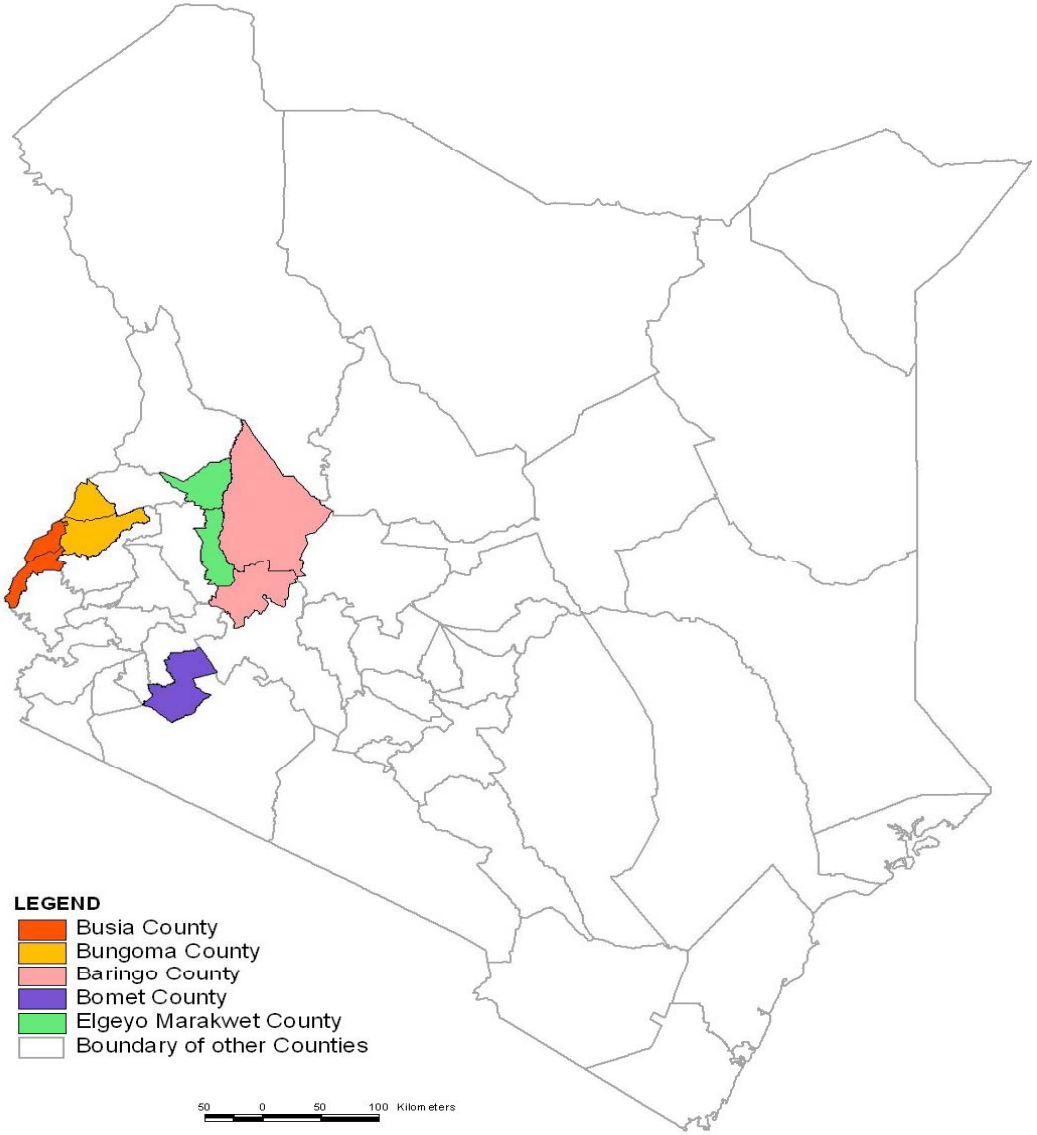
Status of Soil Inventory and Mapping in Kenya

- **Kenya Soil Survey (KSS) mandate**
- **Exploratory Soil Map of Kenya (Scale 1:1 Million) – National land use planning**
- **About 40% of the country mapped at reconnaissance level (Scale 1:100,000 and 1:250,000) – Multipurpose land use planning**
- **Many soil inventories at semi-detailed, detailed and site evaluations for diverse clients - Specific land use planning**
- **This data is available in analogue & digital formats**

Major challenge towards sustainable soil management

- **Land degradation**
  - ➢ **Population pressure**
  - ➢ **Low soil fertility**
  - ➢ **Inappropriate farming practices**
  - ➢ **Deforestation**
  - ➢ **Soil erosion**

Case study: Soil fertility status in Western and Rift Valley regions



Soil fertility status of Baringo County

		% of samples with below adequate levels (n=60)				
Soil Parameter	Critical level	Baringo North	Baringo Central	East Pokot	Koibatek	Marigat
pH	≥ 5.5	35	13	0	67	12
Organic C	≥ 2.7	78	97	100	70	93
Total N	≥ 0.2	67	78	100	33	93
Available P	≥ 30.0	77	63	60	92	78
K	≥ 0.2	0	3	0	0	0
Ca	≥ 2.0	0	0	0	0	0
Mg	≥ 1.0	0	2	0	7	0
Mn	≥ 0.11	0	0	0	0	0
Cu	≥ 1.0	90	52	90	13	47
Iron	≥ 10.0	0	0	0	0	0
Zinc	≥ 5.0	62	73	100	63	77

Soil fertility status of Bungoma County

		% of samples with below adequate levels (n=60)			
Soil Parameter	Critical level	Bumula	Kimilili	Bungoma East	Mt. Elgon
pH	≥ 5.5	27	82	82	7
Organic C	≥ 2.7	100	98	100	8
Total N	≥ 0.2	100	92	63	0
Available P	≥ 30.0	60	97	63	55
K	≥ 0.2	57	52	82	0
Ca	≥ 2.0	23	85	12	0
Mg	≥ 1.0	48	42	40	0
Mn	≥ 0.11	8	5	0	0
Cu	≥ 1.0	32	0	2	0
Iron	≥ 10.0	0	0	0	0
Zinc	≥ 5.0	100	97	100	60

Soil fertility status of Busia County

		% of samples with below adequate levels (n=60)			
Soil Parameter	Critical level	Busia	Teso South	Samia	Butula
pH	≥ 5.5	74	27	18	71
Organic C	≥ 2.7	100	100	97	97
Total N	≥ 0.2	95	93	90	88
Available P	≥ 30.0	81	90	83	85
K	≥ 0.2	36	55	68	62
Ca	≥ 2.0	62	7	5	88
Mg	≥ 1.0	0	0	10	35
Mn	≥ 0.11	0	3	5	0
Cu	≥ 1.0	0	13	2	0
Iron	≥ 10.0	0	0	0	0
Zinc	≥ 5.0	86	98	92	76

Soil fertility status of Bomet County

		% of samples with below adequate levels (n=60)	
Soil Parameter	**Critical level**	**Chepalungu**	**Sotik**
pH	≥ 5.5	2	30
Organic C	≥ 2.7	82	97
Total N	≥ 0.2	67	57
Available P	≥ 30.0	85	97
K	≥ 0.2	0	0
Ca	≥ 2.0	0	0
Mg	≥ 1.0	0	0
Mn	≥ 0.11	0	0
Cu	≥ 1.0	95	92
Iron	≥ 10.0	0	0
Zinc	≥ 5.0	73	32

Soil fertility status of Elgeyo Marakwet County

		% of samples with below adequate levels (n=60)			
Soil Parameter	Critical level	Keiyo North	Keiyo South	Marakwet East	Marakwet West
pH	≥ 5.5	35	67	2	23
Organic C	≥ 2.7	57	42	67	23
Total N	≥ 0.2	23	18	67	5
Available P	≥ 30.0	57	55	53	70
K	≥ 0.2	0	0	22	15
Ca	≥ 2.0	0	0	0	0
Mg	≥ 1.0	0	18	0	0
Mn	≥ 0.11	0	0	0	0
Cu	≥ 1.0	0	48	3	0
Iron	≥ 10.0	0	0	0	0
Zinc	≥ 5.0	45	53	7	85

Inappropriate land use practices

Deforestation and cultivation on steep slopes with little on no soil and water conservation structures leading to low crop yields and food insecurity

Soil erosion and run-off

Lack of soil protective cover leads to high erosion and run-off (more blue than green water)

High erosion in upstream areas leads to siltation of rivers and dams

Other challenges

- **Costs and maintenance of technology**
  - **Geospatial tools e.g. ArcGIS mapping software**
  - **Specialized laboratory equipment for soil and plant analysis**
- **High cost of soil inventories**
- **Technical capacity**
  - **Declining number of soil scientists**
  - **Freeze of new staff employments**
- **Few collaborative/partnership activities**
- **Impacts of climate change and variability on soils and land productivity**

Some needs and priorities towards sustainable soil management

- **ISFM strategies:**
  - **How efficient does knowledge generated by scientists reach farmers considering the declining land productivity?**
  - **To what extent are farmers involved during research and technology development by scientists?**
- **Policy as a major research area:**
  - **How best to use soil resources**
  - **What incentives to offer for sustainable soil management?**

Needs and priorities *contd.....*

- **Involvement of all stakeholders along the research value chain:**
  - **Soil scientists to claim their niche**
  - **Involvement of non-agricultural disciplines**
- **Institutional collaborative research:**
  - **Sharing knowledge and new technologies**
  - **Complementary facilities**
  - **Building scientific and technological capacity**
  - **Joint scaling-up of regional level projects**

THANK YOU

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