

# STATUS OF SOIL RESOURCES IN ZIMBABWE

The needs and priorities for sustainable management

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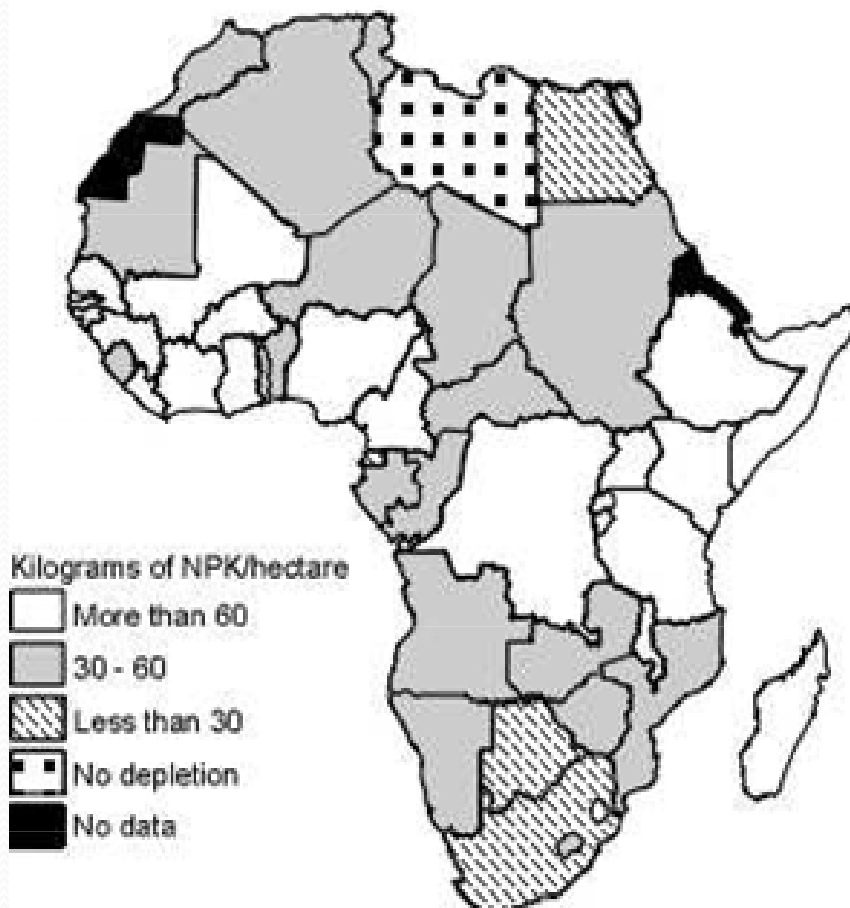
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# Status

- 70% of Zimbabwe soils are sandy & inherently infertile (low in SOM, prone to leaching).
- N and P are the most limiting.
- Low pH in high rainfall and fertilized areas..limited effectiveness of applied fertiliser (e.g. P).
- Multiple nutrient deficiencies in degraded soils (inc. Ca, Mg, Zn, B).... Limit NPKS fertilizer effectiveness (Zingore et al., 2008).
- Soil erosion in high population density areas from cropping and overgrazing.
- Majority (ca. 75%) of smallholder areas located on sandy soils in semi arid areas. These farmers have limited resources (inputs, knowledge).
- Limited experience of newly resettled farmers .

**Figure 1—Average annual nutrient depletion (NPK) in Africa, 1993-95**



**Average nutrient application rates in 2002/3 (kg/ha arable land)**

SSA – 9  
 Latin America-73  
 South Asia – 100  
 E & SE Asia- 135  
 (FAO, 2004)

**Average Grain Yield**

Africa – 1 t/ha  
 World – 3 t/ha  
 (Africa Fertiliser Summit, 2006)





# The Zimbabwe Soil Classification

- Zimbabwe is one of few countries with own soil classification system.
- The Zimbabwe National Soil Classification System is based on parent material and physico-chemical properties of the soil.
- The following table presents the soil classes of Zimbabwe

# Soil classes of Zimbabwe

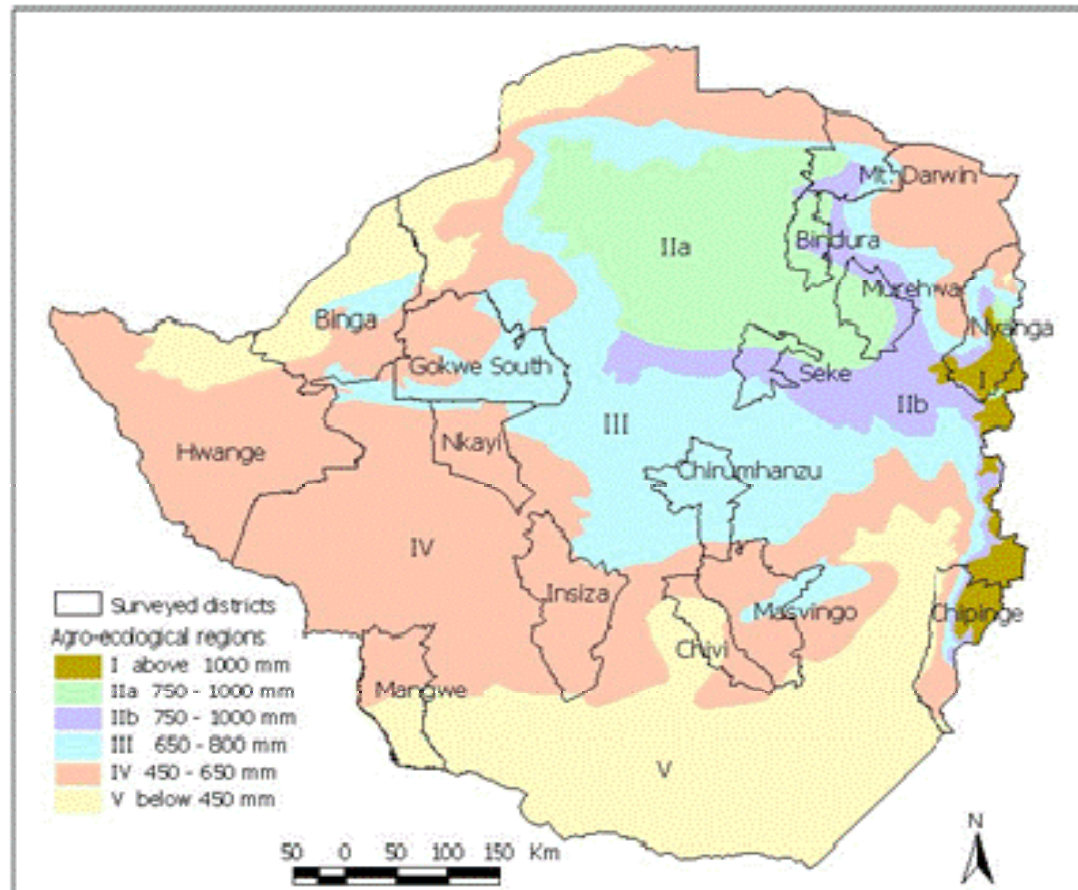
ORDER	DESCRIPTION	GROUP	TYPICAL SOIL FAMILIES
1.AMORMIC	Little or no horizon development	1.Regosol - Deep sands 2.Lithosol -Extremely shallow	1K(Deep sands derived from Kalahari deposits) 2E(derived from mafic rocks)
CALCIMOPHIC	Unleached soils generally with large reserves of weatherable minerals: high base saturation.	3. Vertisols - Very acidic clay 4.Siallitic - Active clay	3B(derived from basalt) 4PE(derived from mafic gneiss)
KAOLINITIC	Moderately to strongly leached soils; appreciable amounts of free sesquioxides of iron and aluminum.	5.Fersiallitic mixed clay 6.Paraferallitic inert clay 7.Orthoferallitic	5G(coarse grained sandy soils derived from granite) 6G 7G
NATRIC	Dominated by appreciable amounts of sodium as the exchangeable ion	8.Sodic Weakly sodic Strongly sodic Saline sodic	8n 8N 8h





# Distribution, Properties and Management of soil types in Zimbabwe

# Agro ecological Zones of Zimbabwe



# Land-use and Agro-ecological Zones

- the Land-use (needs and priorities) depends on:
  - ❖ the soil type
  - ❖ agro-ecological zone in which that particular soil class falls in.
  - ❖ e.g. Region I (high rainfall), most soils are acidic and highly leached (Acrisols).
  - ❖ This means that proper lime and fertiliser management is essential for optimal crop production.



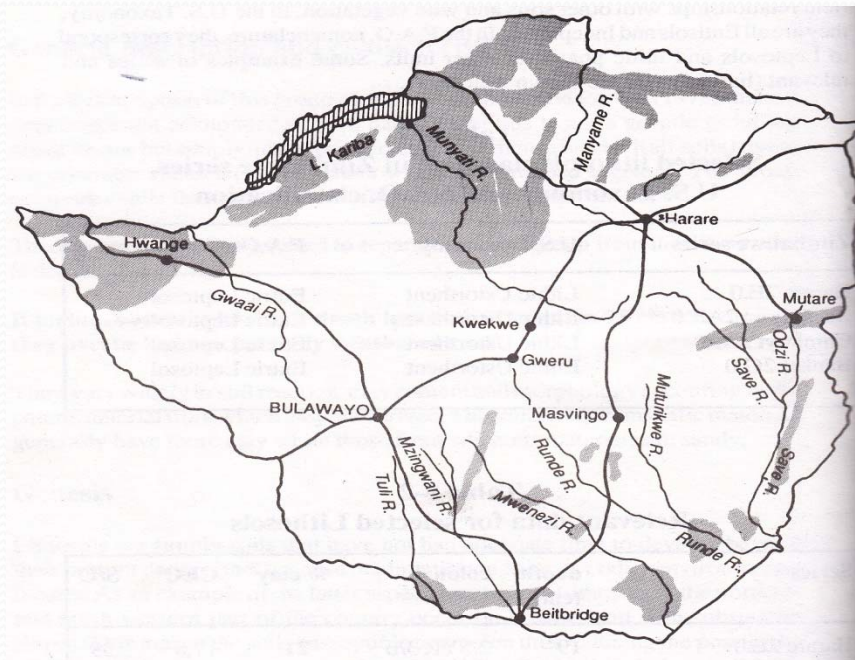


## Lithosols(WRB, 2006: Leptosols)

- limitation of depth by *continuous rock within 25 cm of the soil surface*
- Steep slopes-----susceptible to erosion
- Most common land use is Game reserves and national parks

# Geographical Distribution of Leptosols

- Mostly found in the Northern and North-western part of the country on slopy areas







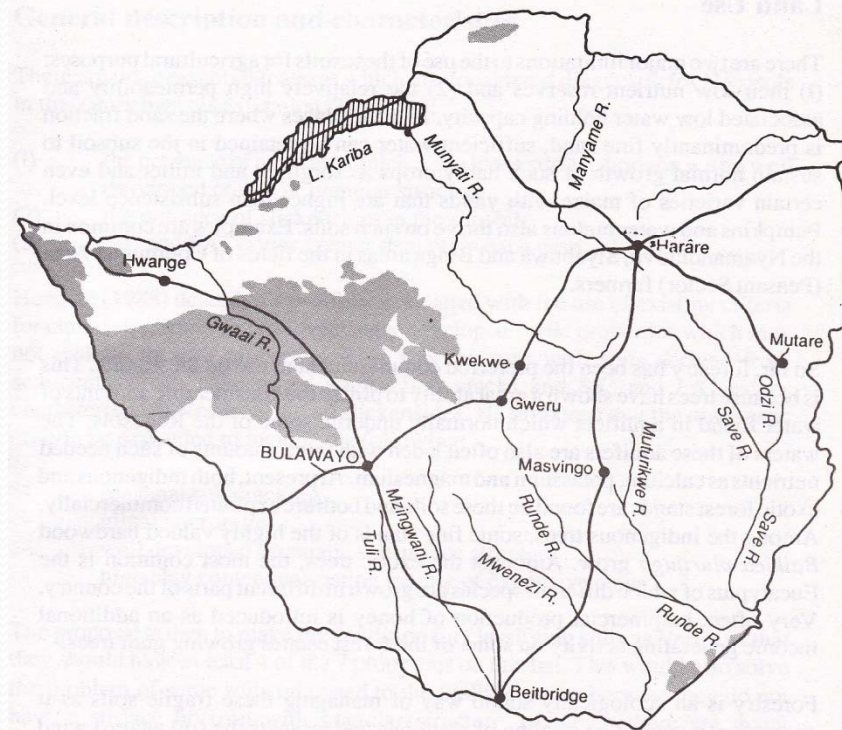
# Regosol(WRB,2006: Arenosol)

- Thick sand profiles
- Shows little or no horizon development
- Usually found on flat or on gently undulating topography
- Used for National Parks, Game Reserves, Forests and some smallholder farming areas.



# Geographical Distribution of Arenosol

- Found mainly in the western part of the country i.e. Hwange, Lupane and Nkayi



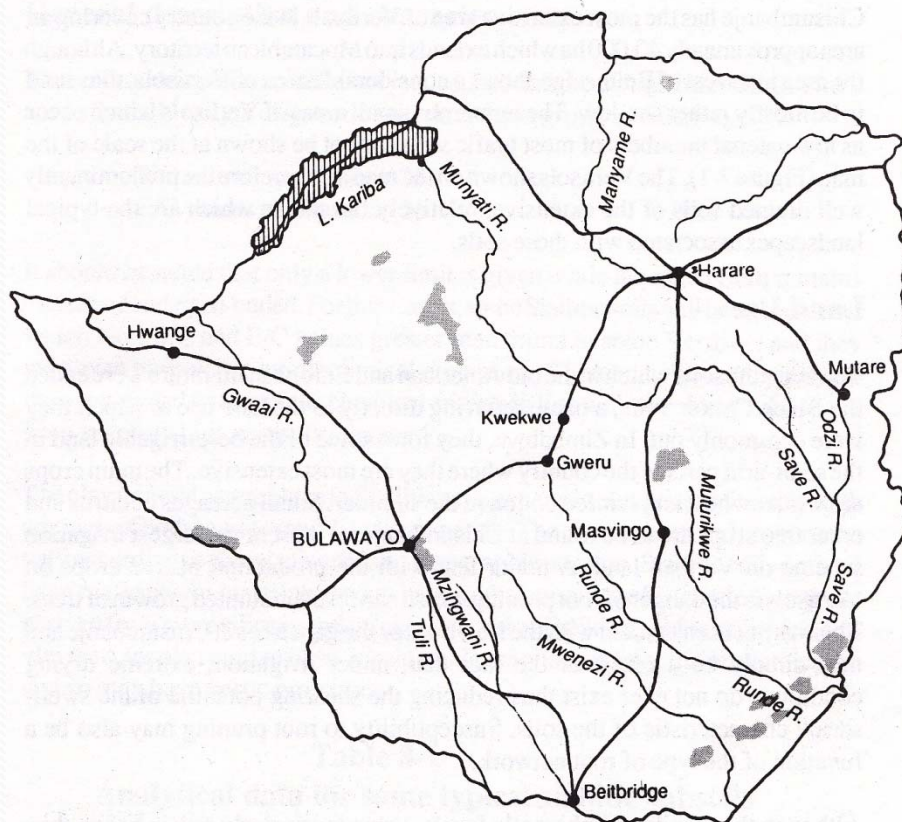
# Vertisols(WRB, 2006: Vertisols)

- Seasonal cracking
- High clay content consisting of mainly expansive clay
- high moisture-holding capacity is their clay content
- Sugarcane, cotton and citrus tree plantations are the mainly land of the vertisols in Zimbabwe



# Geographical Distribution of Vertisols

- Mostly found in the semi-arid regions of Zimbabwe





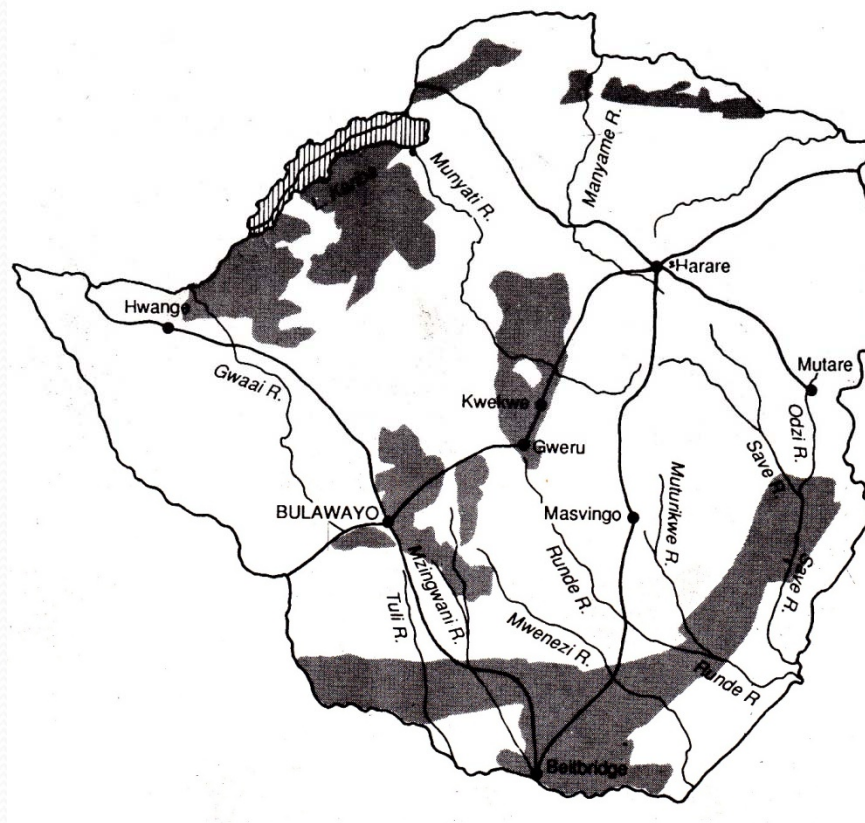


## Siallitic(Luvisols, Gleysols, Cambisols)

- Clay soils comprising of both 2:1 clay minerals.
- Profile mostly shallow to relatively shallow.
- High agricultural potential soils but are limited by aridity of the environment where they occur.
- Used for irrigated sugarcane and wheat production in the South-eastern lowveld.
- Used for ranging of cattle and wild life in the North-western part of the country.

# Geographical Distribution of Siallitic

- These soils are found in the North-western part of the country





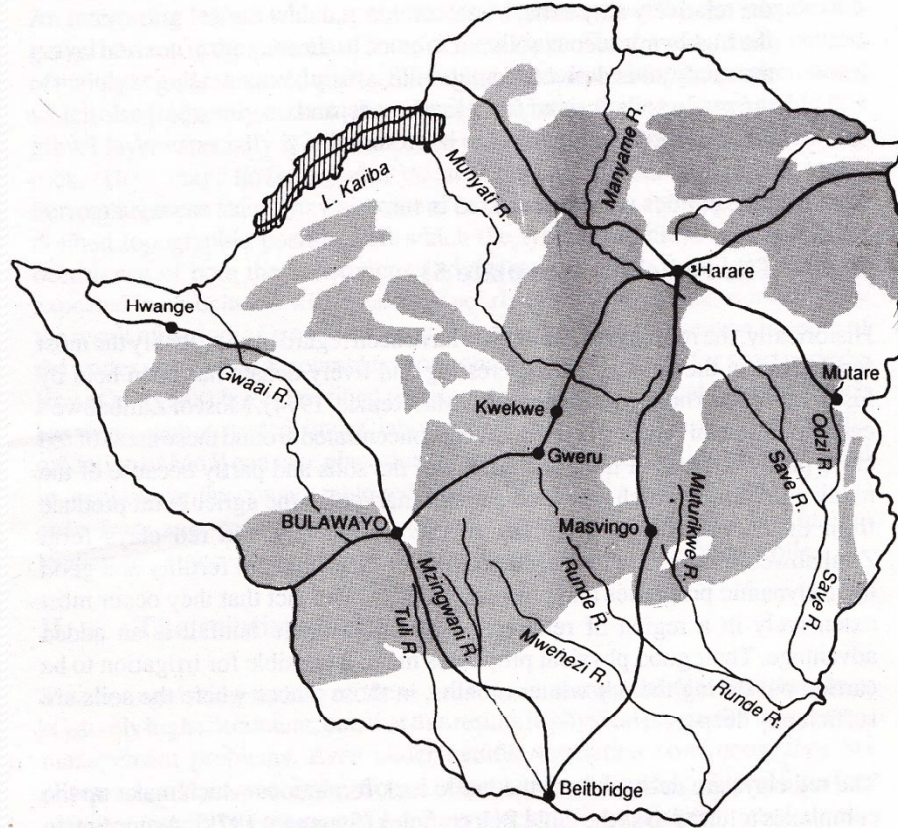
# Fersiallitic(Nitisols, Luvisols)

- Appreciable amounts of free sesquioxides.
- Have moderate phosphate sorption capacity
- Fersiallitic soils are the most extensive soil group in Zimbabwe.
- They are the most in crop production.
- Most of Zimbabwe's maize belt lies within the area covered by these soils.



# Geographical Distribution of Fersiallitic

- most extensive soil group in Zimbabwe



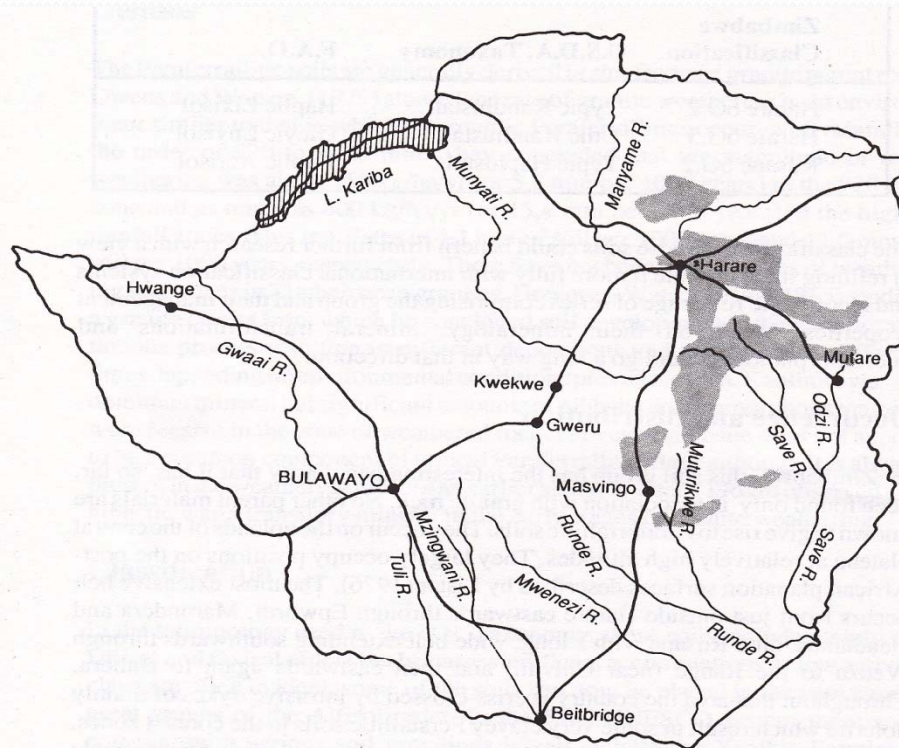
# Paraferrallitic(Lixisol,Acrisol)

- Highly leached soils found in high rainfall zone.
- They occur on the uplands of the central plateau at relatively high altitudes.
- Occur in high rainfall potential areas of Zimbabwe
- They are the best for tobacco production.
- Maize production is also practiced.



# Geographical Distribution of Paraferallitic

- these occur in high rainfall potential areas of Zimbabwe



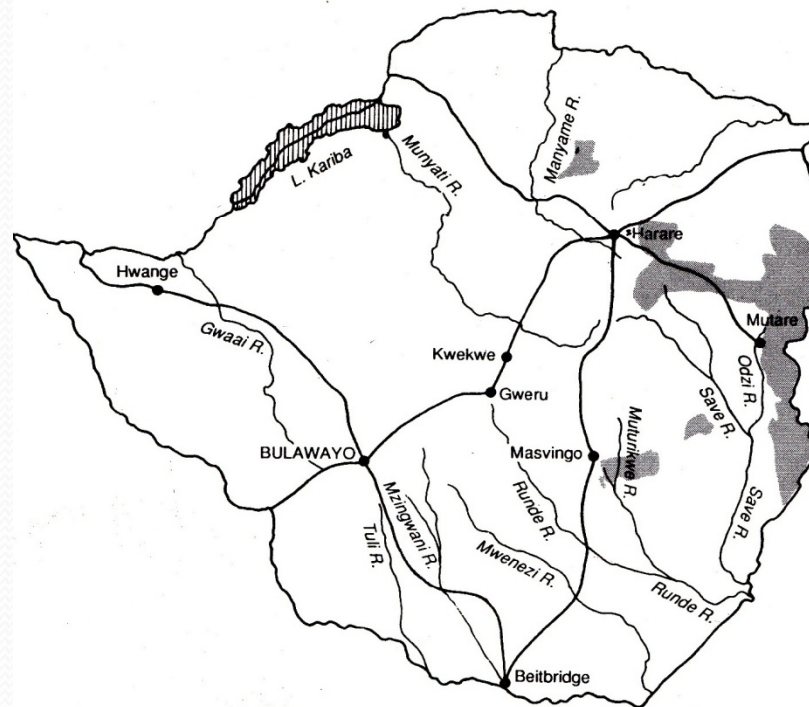
# Orthoferrallitic(Acrisols, Ferralsols )

- Moderately deep soils.
- Very fine weakly developed crumb structure
- Very high porosity.
- Orthoferrallitic Soils have a relatively poor nutrient status and they are mostly covered by
  - Forestry
  - Plantations crops e.g. coffee and tea



## Geographical Distribution of Orthoferrallitic Soils

- Occurs in the eastern highlands, the Bikita – Ndanga highlands in the south-east of the country



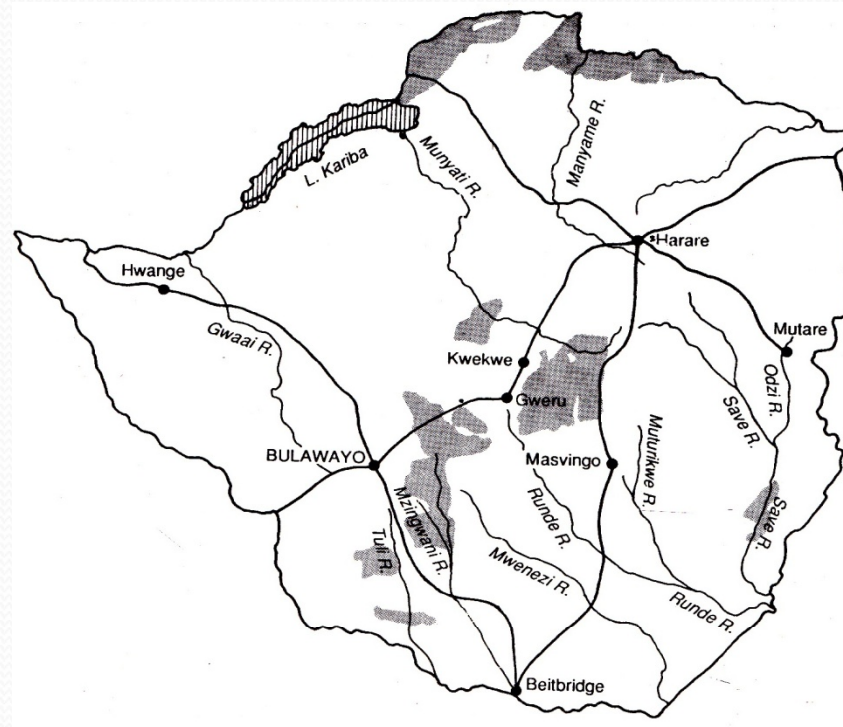
# Sodic(Solonetz,Solonchaks) Soils

- Sodic soils high concentration of Na (E.S.P  $\geq 15$ ).
- These are not suitable for most cropping activities.
- Used to grow crops tolerant to high Na and high pH, e.g. cotton, sorghum, millet.



# Geographical Distribution of Sodic Soils


- These soils are found in the Zambezi and Save (on the south eastern part of the country) valleys



# Current interventions

- BNF for legume production, Govt owned factory available for Rhizobia production.
- IFSM – use of manure and mineral fertilizer, improved seed (>90% of farmers).
- Conservation Agriculture to control soil degradation (e.g. soil erosion), >100,000 households by 2011.
- Micro-dosing to encourage fertilizer use in semi arid areas where fertilizer previously not used.
- Soil testing based fertilizer and lime recommendations to increase crop productivity.
- Water harvesting techniques in semi arid areas (tied ridges, graded contours, infiltration pits, etc).





Thank you  
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Siyabonga  
Asante