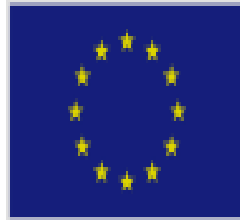


DLRC



LAND PROFILING & SOIL LOSS STATUS MALAWI



Food and Agriculture Organization
of the United Nations

LAND PROFILING

Malawi soils are dominated by

cambisols (S)

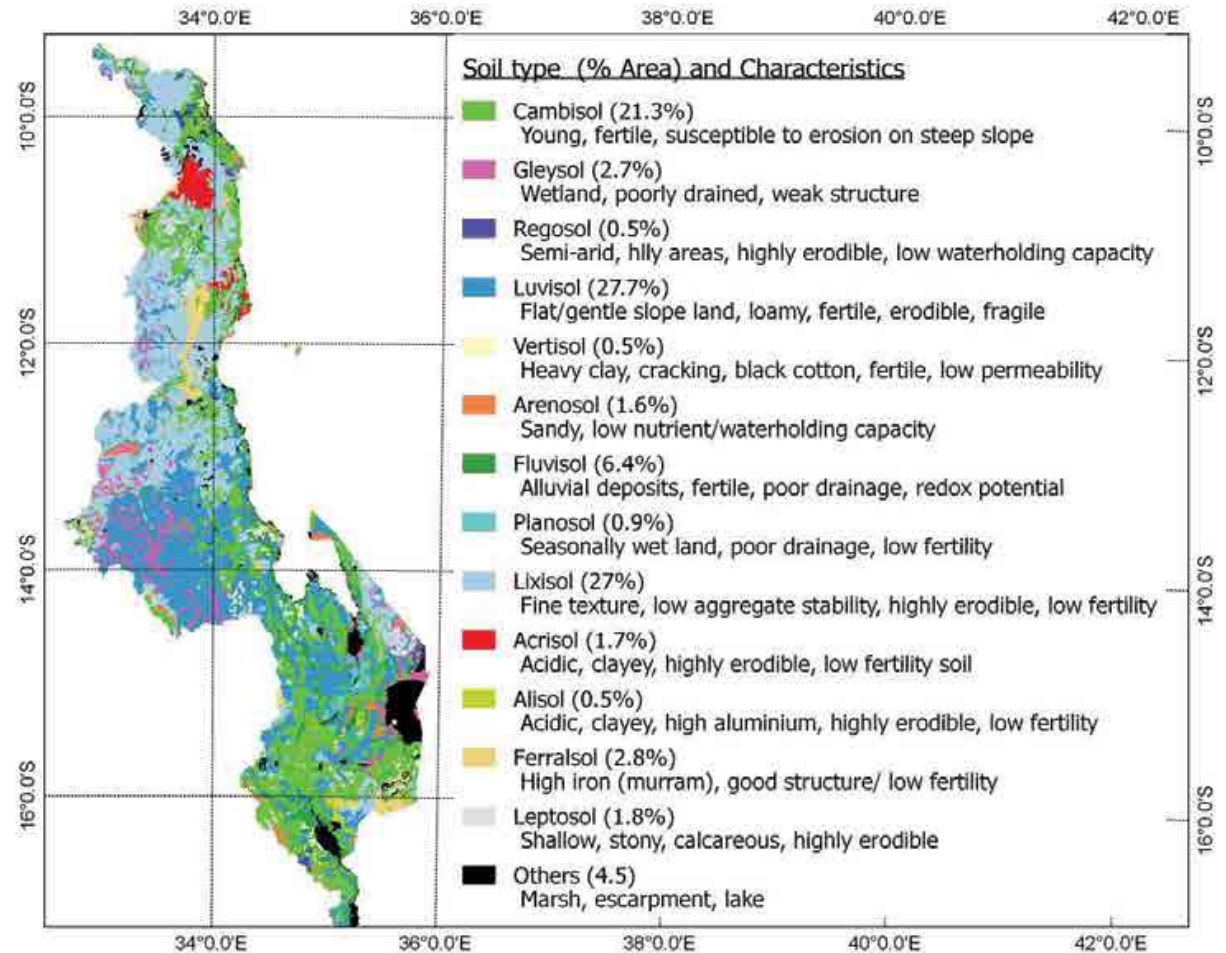
Lixisols (n)

luvisols (c)

Cambisols & luvisols-

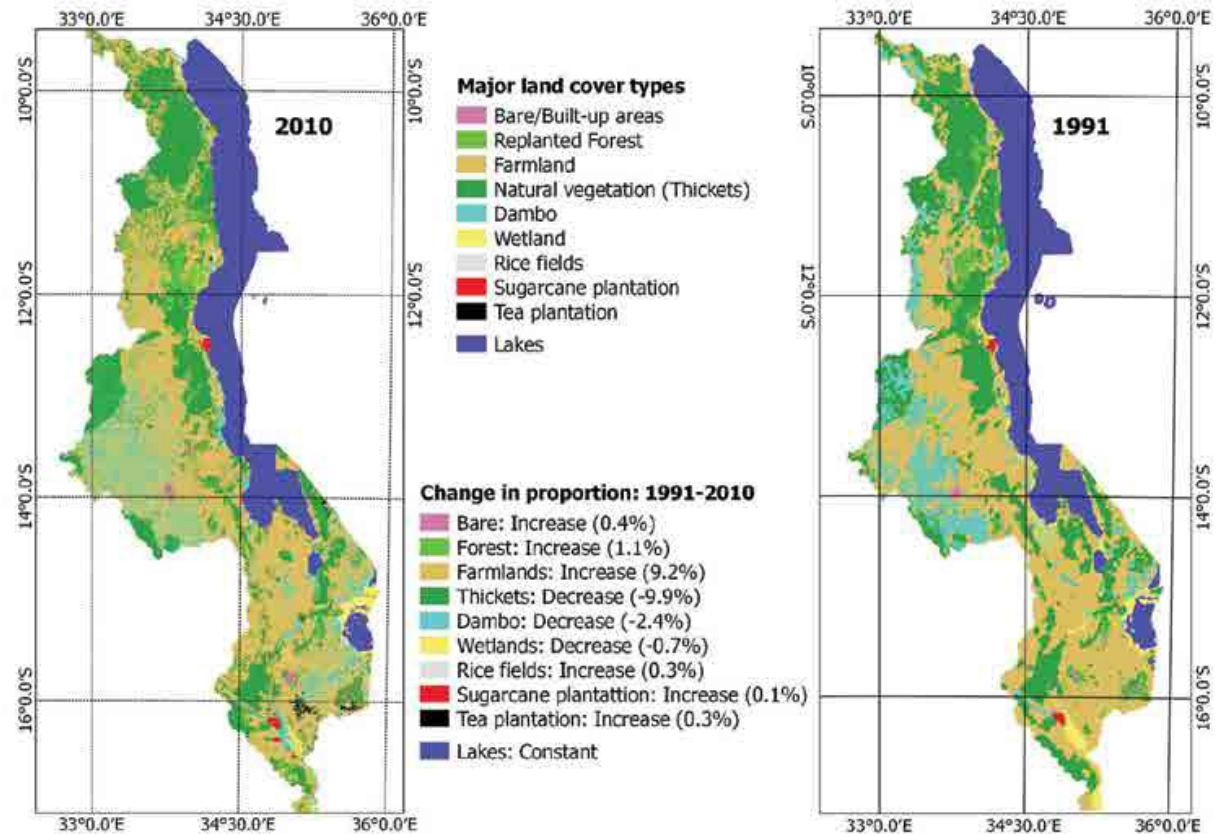
good nutrient characteristics

Lixisols- low aggregate stability



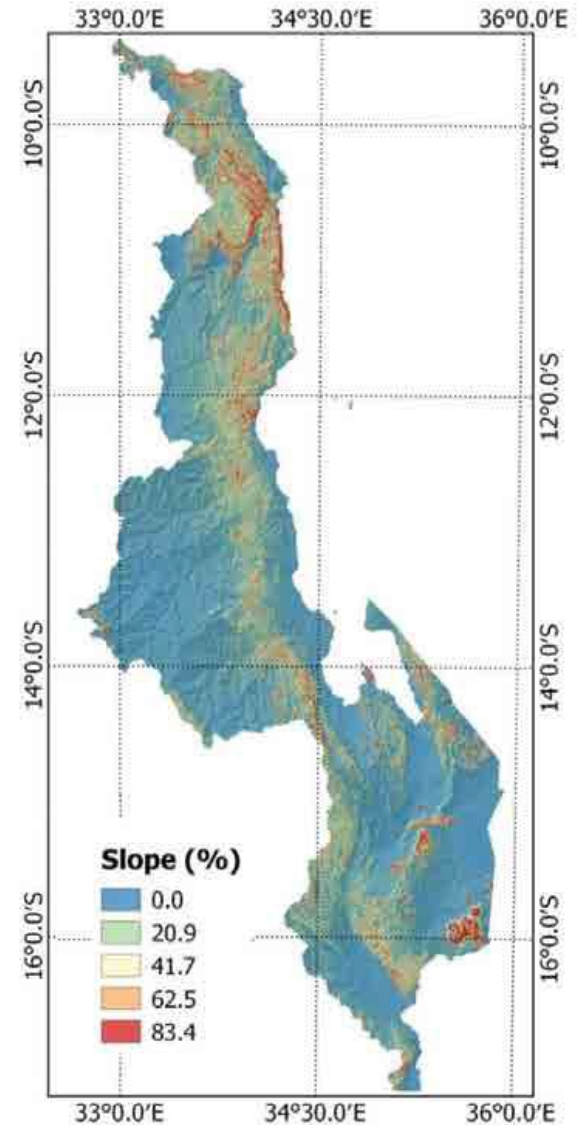
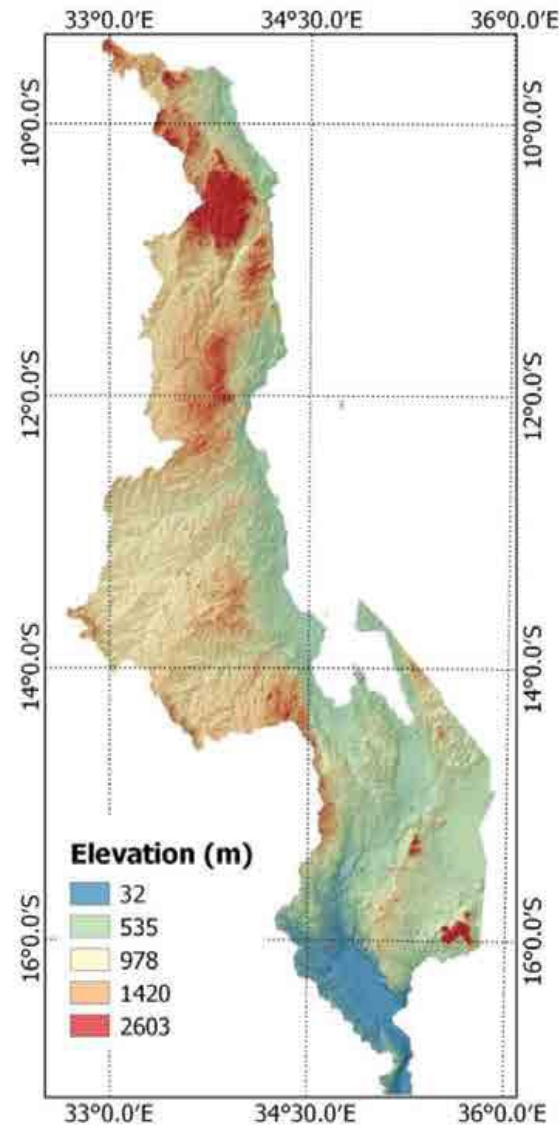
Main land use/covers
in malawi are:

- Farmlands (9%)
- natural forests
- forest plantatio
- wetlands
- built -up areas
- lakes



Malawi has four topographic categories:

- *Hilly & undulating terrain (north & parts of Souther region)*
- *Mid –altitude flat/gentlly sloping plateaux (Centre)*
- *steep slopes of the rift valley region*
- *Flat/gently sloping plains in the south*



The objective in developing this categories

*-primarily is to guide broad, **strategic thinking** on where specific investments and development programs, both public and private, could best be placed across Malawi to promote increased commercialization of agricultural production.*

*-Not only are we interested in whether an agricultural commodity can be produced in an area, we also need to consider whether farmers there will consistently be able to **produce the commodity in a profitable manner.***

The objective in developing this categories

- The principle objective of land evaluation is to select the optimum land use for each defined land unit, taking into account both physical and socioeconomic considerations and the conservation of environmental resources for future use.*

Land Profiling

□ Provided information on:

- ✓ *suitable conditions*
- ✓ *precise information about land availability,*
- ✓ *land suitability and land accessibility*

***Land Resources Evaluation Project (LREP)
undertaken by UNDP, FAO and Ministry of
Agriculture, Irrigation and Water Development***



Land Profiling

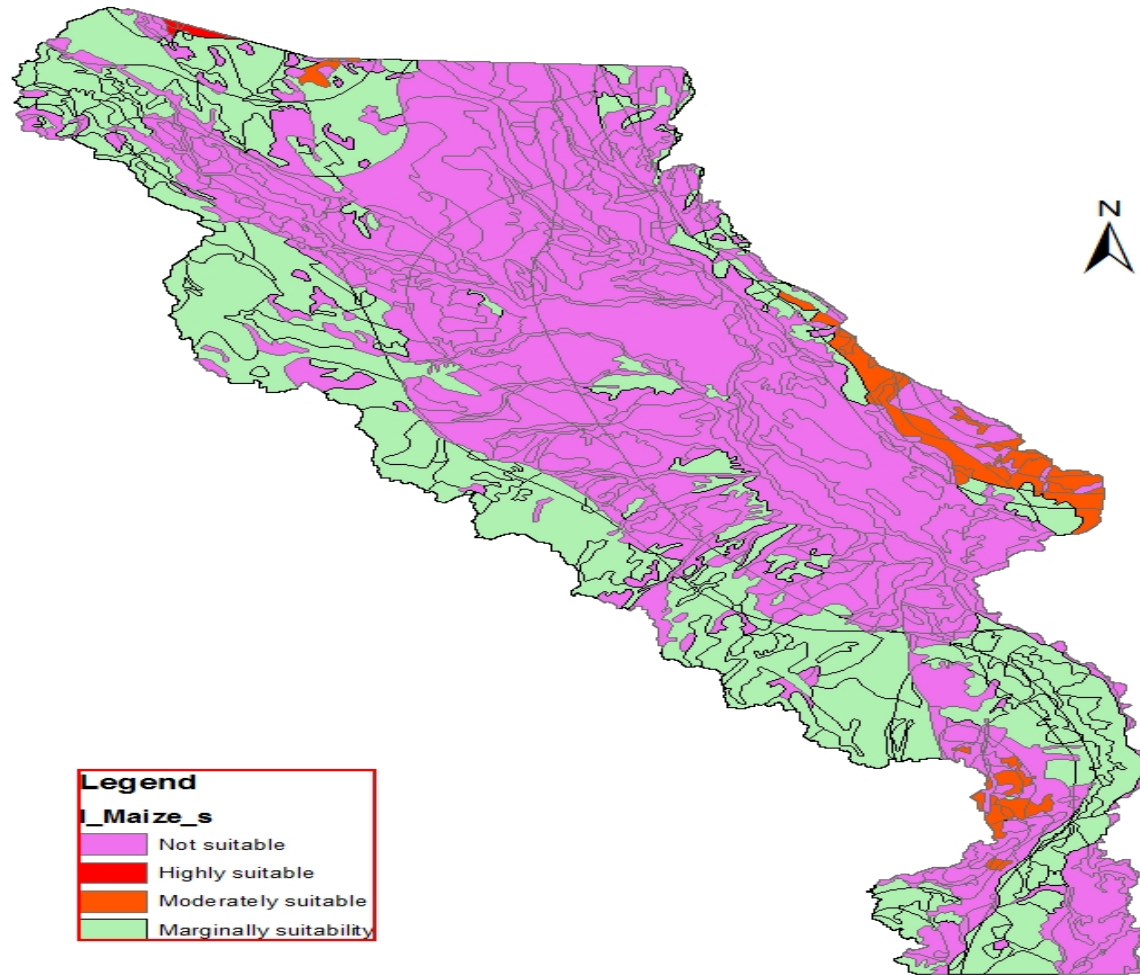
- ✓ *Results of LREP was made available in 1991*
- ✓ *This comprised of maps and reports for the eight ADDs*
- ✓ *The only drawback was the scale (1:250,000) and paper form*
- ✓ *A set of land suitability maps of the **top five suitable crops**.*





Land suitability for maize

LAND SUITABILITY FOR MAIZE (Short Cycle) Improved Traditional Management





Land suitability for groundnuts

Soil Loss Study

World Bank (1992)

modified the methodology by Khonje and Machira (33ton/ha/yr)(1987) and developed a new soil loss rate of **20 ton/ha/year**.

-The **20 ton/ha/year** of soil loss, established by World Bank, has been used as our benchmark for over two decades



Background

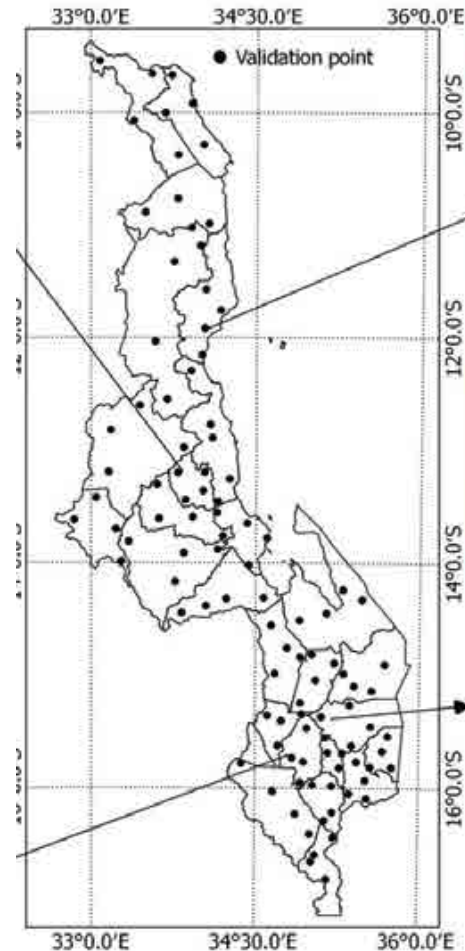
These necessitated the need to revise the rate of our soil loss, to contribute to monitoring implementation of the program.

The study was commissioned 2013 using SLEMSA Model



Field validation

- ❖ In-situ testing
- ❖ Online data collection and validation
- ❖ Establishment of monitoring sites



In situ soil testing



In situ measurement and testing



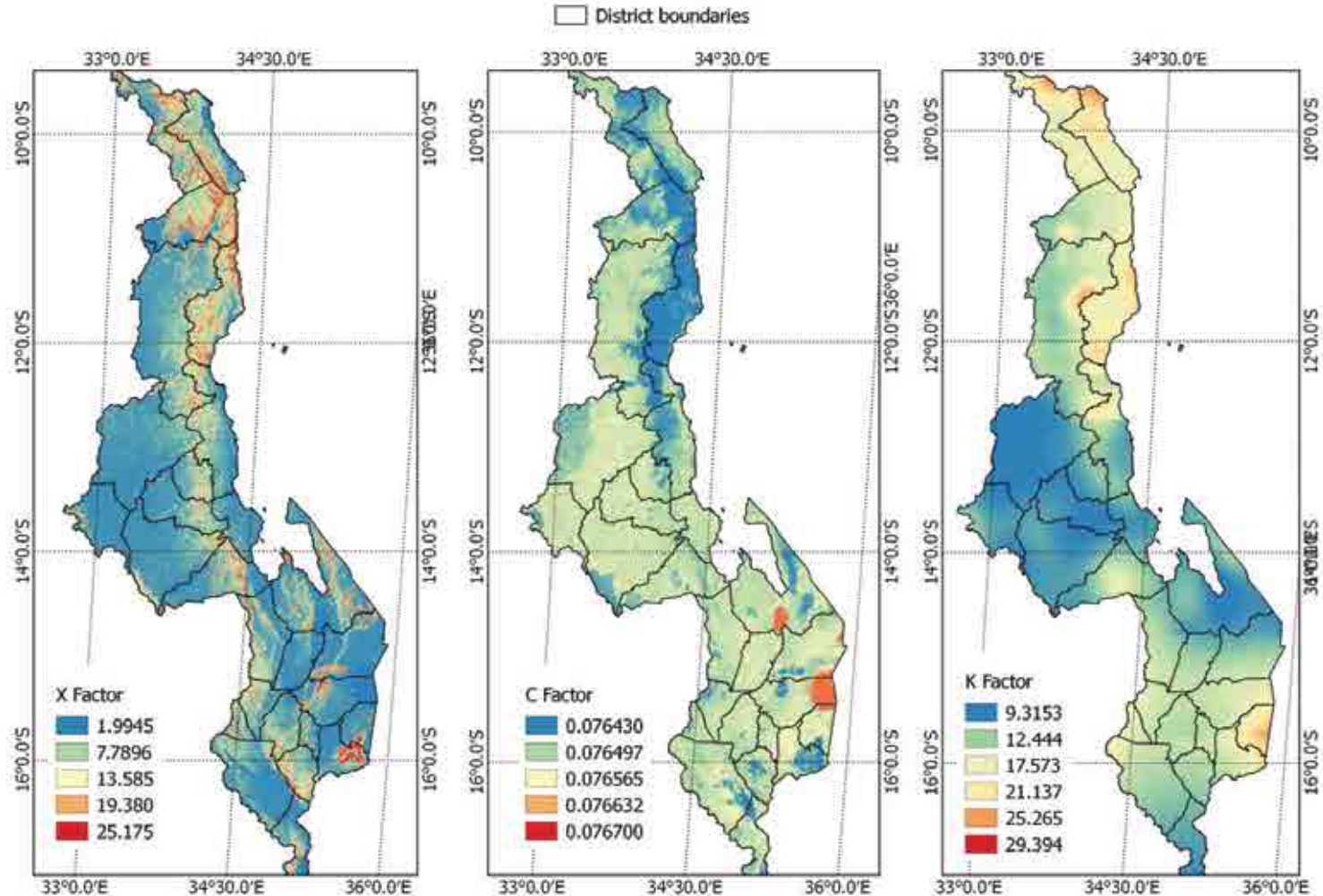
STUDY RESULTS

SLEMSA Input factors

- ✓ The Rift Valley ridge had the **highest topographic factor (X)** values owing to its steep slopes.
- ✓ The northern and southern regions, which had high **Soil factor (K) values**, are dominantly occupied by highly **erodible Lixisols and Cambisols**.
- ✓ This implies that the **northern region and the rift valley are more vulnerable** than the other parts of the country in terms of soil, relief, and climatic factors.
- ✓ The two regions are naturally predisposed to soil loss and that soil loss in these regions can be **accelerated or reduced** by soil management practices.

STUDY RESULTS.....

4.1 SLEMSA Input factors.....



STUDY RESULTS

Soil Loss Rates - National

- ✓ In 2014, the soil loss rates were high in the northern and southern regions.
- ✓ The northern region had soil loss rate ranging between 0.4 ton/ha/yr. to 39 ton/ha/yr.
- ✓ **Nkhata Bay** was the most affected district while **Kasungu** was the least affected.



STUDY RESULTS.....

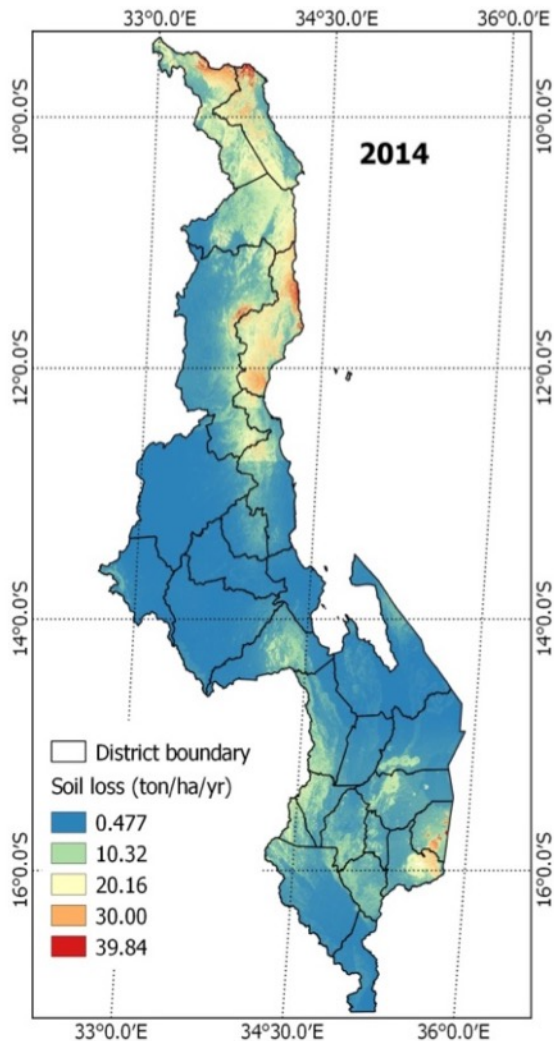
Soil Loss Rates – National.....

- ✓ Nkhata Bay had the majority of steep slopes, fragile soil, and high rainfall, all of which could have contributed to high soil loss rates.
- ✓ Overall, the national average soil loss rate was [29 ton/ha/yr.](#)
- ✓ The areas with high extremes of soil loss rates were found to have had steep slopes, shallow soil, and with low vegetation cover



STUDY RESULTS.....

Soil Loss Rates – Statistical Results By District

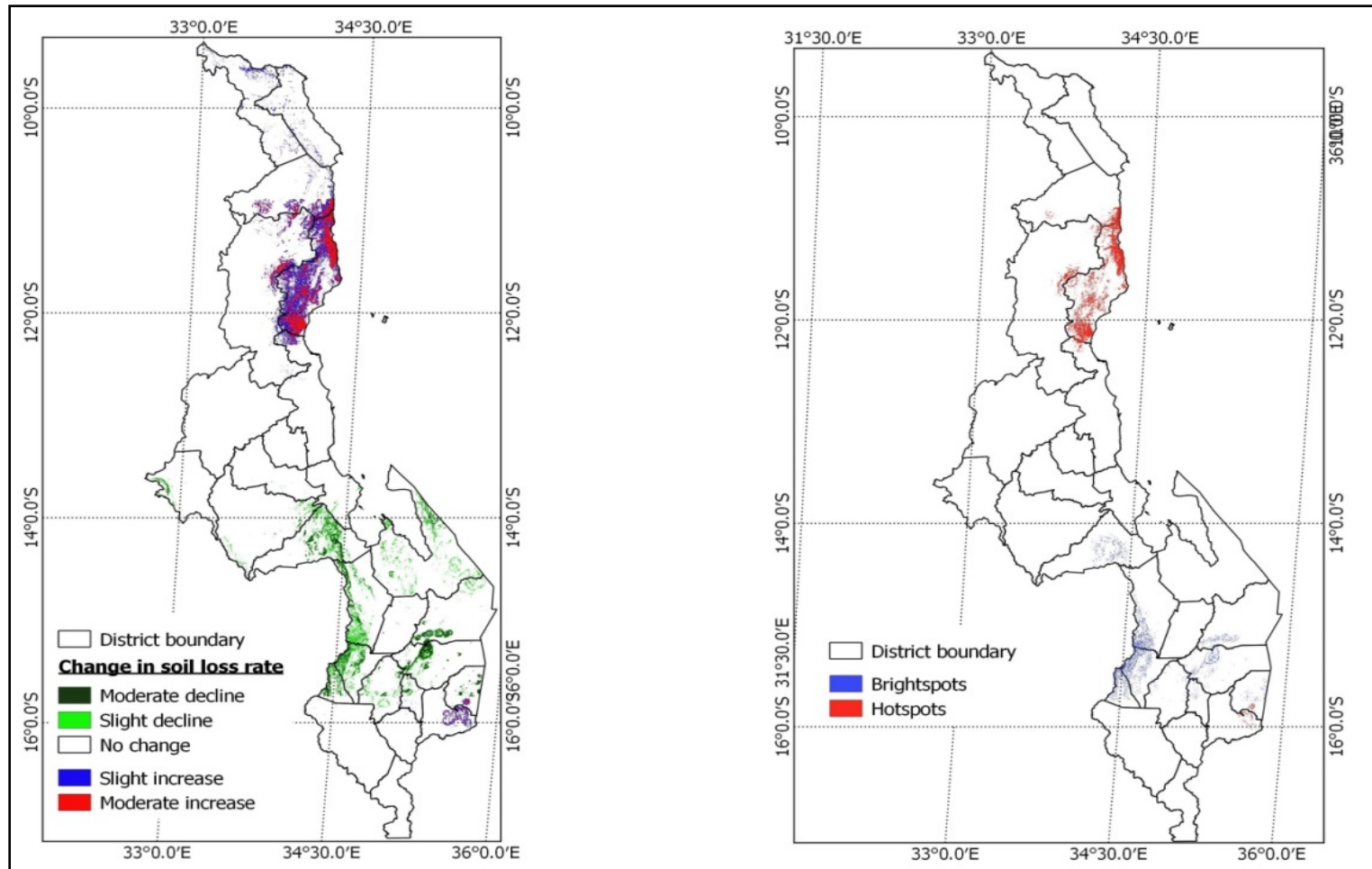


REGION	DISTRICT	MEAN	STDEV	MINIMUM	MAXIMUM
North	Chitipa	15.22	7.8	0.4	39.08
North	Karonga	15.81	8.59	0.69	39.74
North	Nkhata Bay	19.83	7.35	2.28	38.01
North	Rumphi	11.24	6.4	0.78	30.84
North	Mzimba	6.42	5.75	0.43	33.94
Central	Kasungu	0.89	1.19	0.13	14.55
Central	Nkhotakota	6.43	6.11	0.56	30.6
Central	Ntchisi	2.76	1.82	0.34	8.93
Central	Dowa	0.9	0.46	0.24	3.43
Central	Salima	1.11	0.59	0.31	7.23
Central	Lilongwe	1.05	0.74	0.24	8.17
Central	Mchinji	1.07	1.23	0.22	9.81
Central	Dedza	4.17	3.4	0.39	19.88
Central	Ntcheu	4.53	3.5	0.38	19.48
South	Mangochi	1.44	1.35	0.11	9.97
South	Machinga	2.44	2.76	0.2	16.55
South	Zomba	4.92	3.29	0.98	20.49
South	Chiradzulu	5.37	2.85	1.22	18.41
South	Blantyre	5.49	2.9	1.07	16.16
South	Thyolo	6.19	2.13	0.91	15.37
South	Mulanje	9.64	7.76	1.57	33.4
South	Phalombe	10.22	8.15	2.54	35.17
South	Chikwawa	3.35	2.81	0.54	21.33
South	Nsanje	1.46	1.03	0.26	7.97
South	Balaka	2.1	1.05	0.38	12.64
South	Mwanza	9.03	4.51	1.27	23.32
South	Neno	7.44	4.26	1.44	21.07



STUDY RESULTS...

Hotspots



SOIL LOSS ATLAS

- ✓ A collection of maps showing
 - severity of soil loss
 - Land cover changes from 1991 -2010
 - Elevation
 - Soil Types

- ✓ Statistical Description of soil loss risk factors

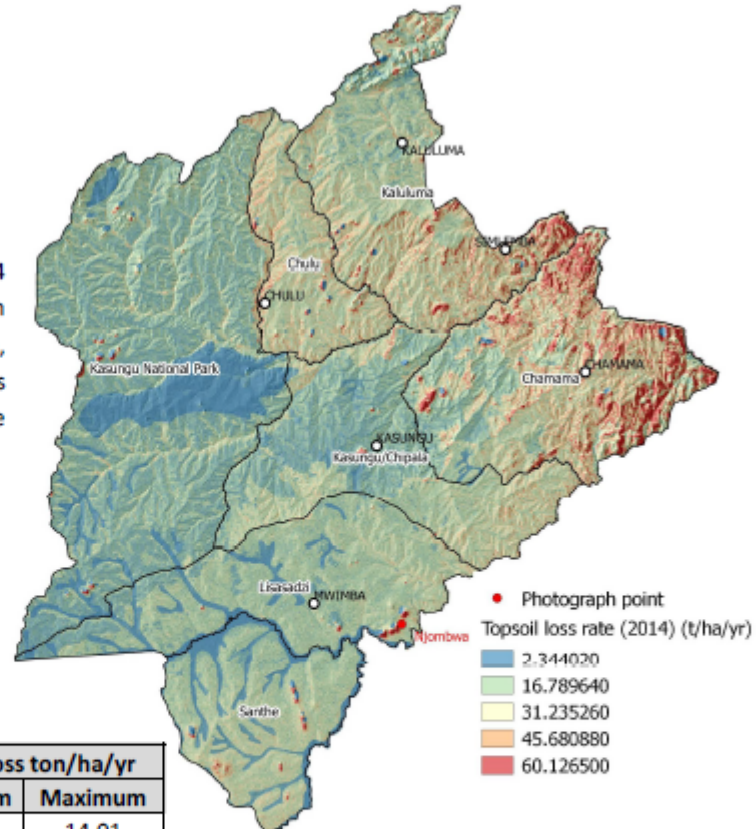
- ✓ Pictures showing
 - Degraded sites
 - Some soil conservation Measures



KASUNGU

Topsoil loss rate

The mean district topsoil loss rate in 2014 was 0.89 t/ha/yr. Higher soil loss rates can be found in the eastern parts (in Chamama, Chulu, and Kaluluma EPAs). The main factors for the soil loss rates in these areas include soil vulnerability and soil management



Extension Planning Area (EPA)	2014 Topsoil loss ton/ha/yr		
	Mean	Minimum	Maximum
Kaluluma	1.48	0.15	14.01
Kasungu National Park	0.27	0.13	8.23
Chulu	1.07	0.14	12.34
Chamama	1.82	0.24	14.55
Kasungu/Chipala	0.56	0.19	11.12
Lisasadzi	0.78	0.13	5.45
Santhe	1.06	0.25	10.23

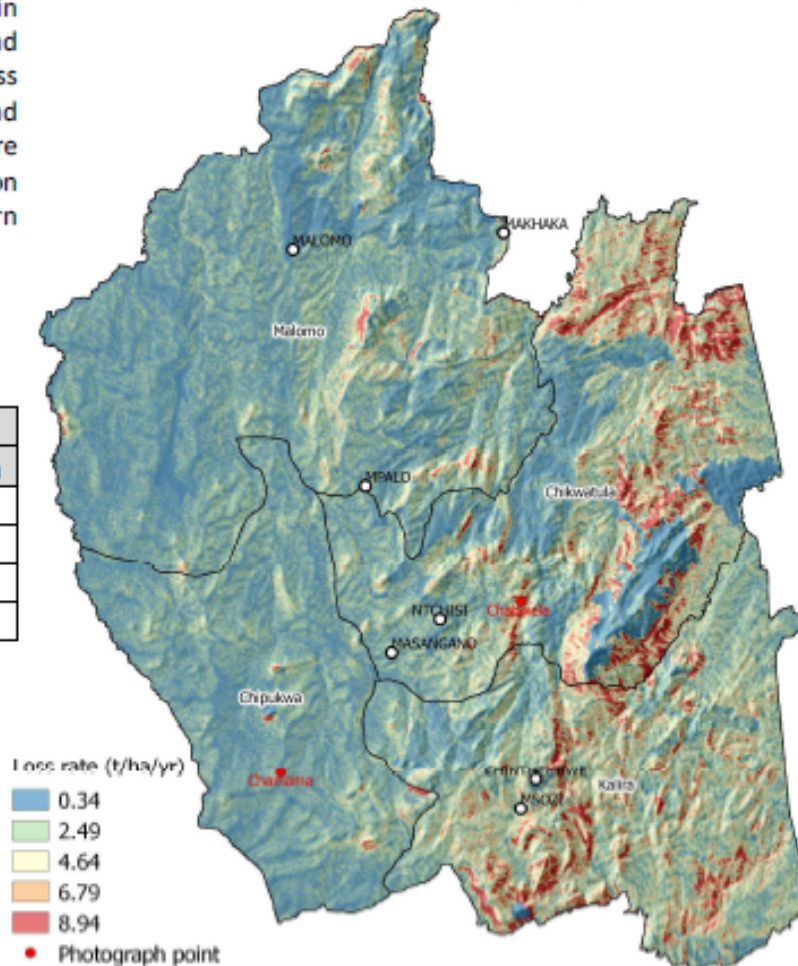
NTCHISI

Topsoil loss rate

The mean district topsoil loss rate in 2014 was 2.76 t/ha/yr. Higher soil loss rates are mainly in the eastern parts of the district (in Chipukwa, and Kalira EPAs). The main factors for the soil loss rates in these areas include soil vulnerability and soil management. Sheet, rill and gully erosion are the most common forms of erosion. Gully erosion are common in the hilly areas (in the eastern parts) of the district.

Extension Plan- ning Area (EPA)	2014 Topsoil loss ton/ha/yr		
	Mean	Minimum	Maximum
Malomo	1.86	0.41	4.02
Chikwatula	3.43	0.98	8.93
Chipukwa	1.57	0.34	5.58
Kalira	4.28	0.57	6.70

Topsoil loss rate (2014)

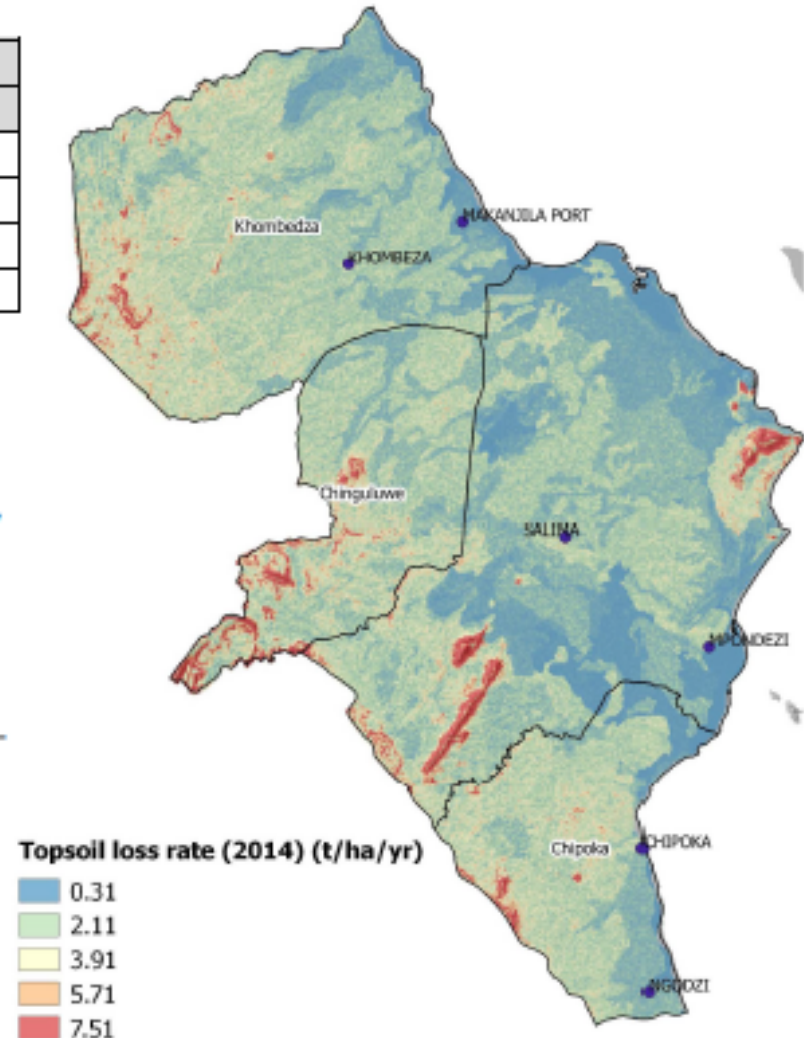


SALIMA

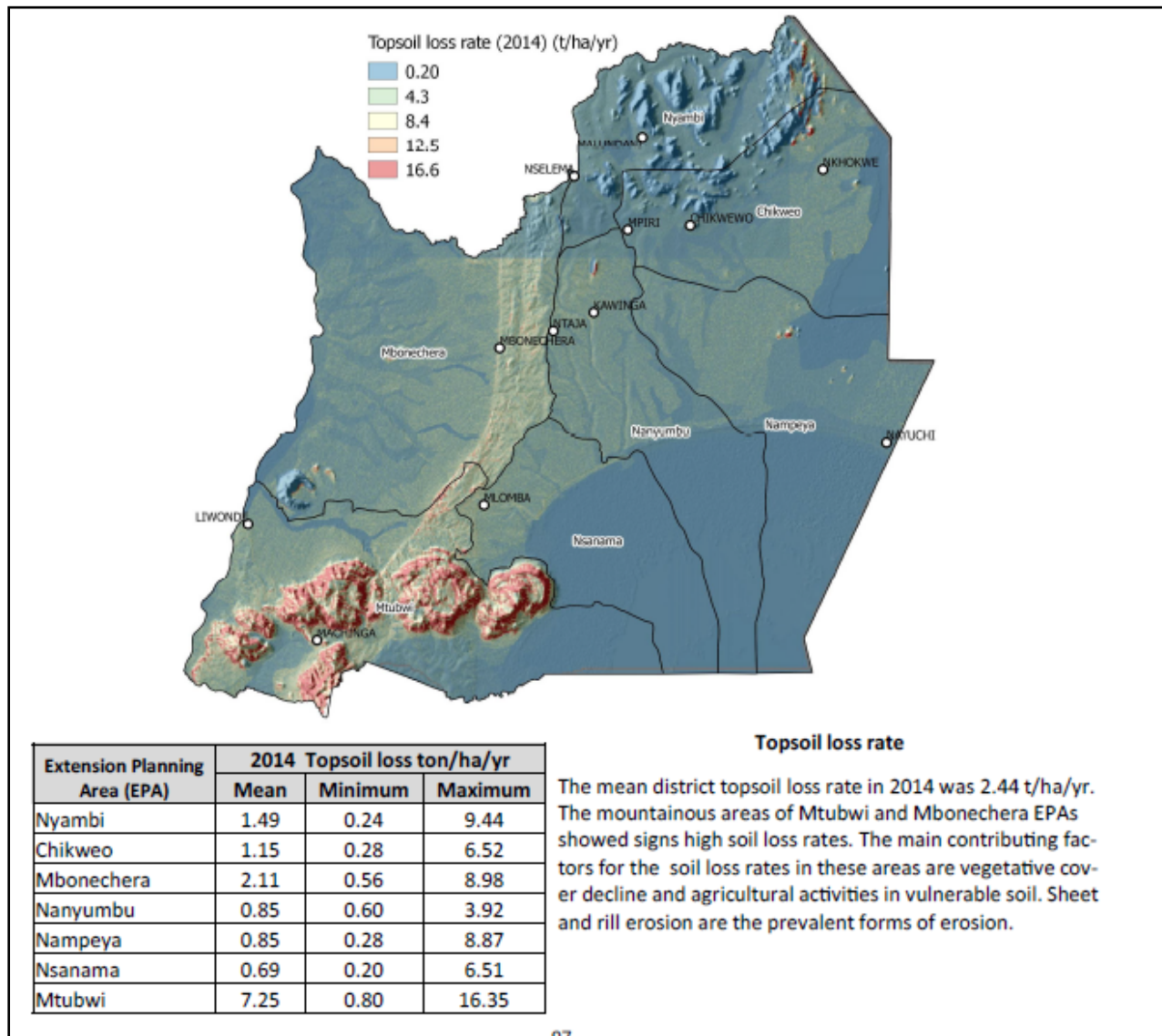
Extension Planning Area (EPA)	2014 Topsoil loss ton/ha/yr		
	Mean	Minimum	Maximum
Khombedza	1.38	0.55	6.29
Chinguluwe	1.66	0.80	7.23
Chipoka	1.37	0.62	5.77
Tembwe	1.10	0.31	5.56

Topsoil loss rate

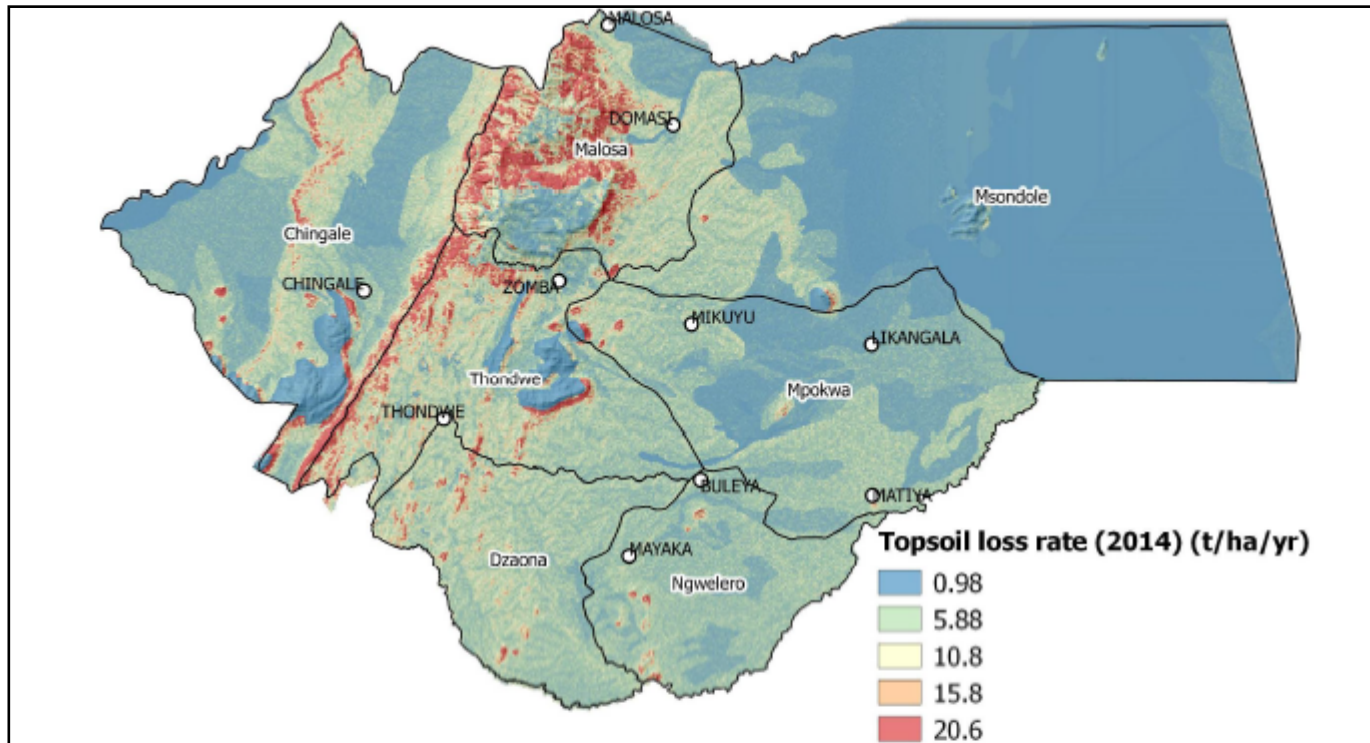
The mean district topsoil loss rate in 2014 was 1.10 t/ha/yr. Khombedza and Chinguluwe were the only EPAs with indications of high soil loss rates in the district. The main contributing factors for topsoil loss rates in these areas include the presence of vulnerable soils and agricultural intensification. Sheet and rill erosion were the most common types of erosion in the district.



MACHINGA



ZOMBA.....

**Topsoil loss rate**

The mean district topsoil loss rate in 2014 was 4.92 t/ha/yr. The escarpments in Malosa and Thonwe were the only areas with indications of high soil loss rates in the district. The main contributing factors for topsoil loss rates in these areas include the presence of vulnerable soils, shallow soil and loss of vegetation cover. Gully, sheet and rill erosion are the most common types of erosion in the district.

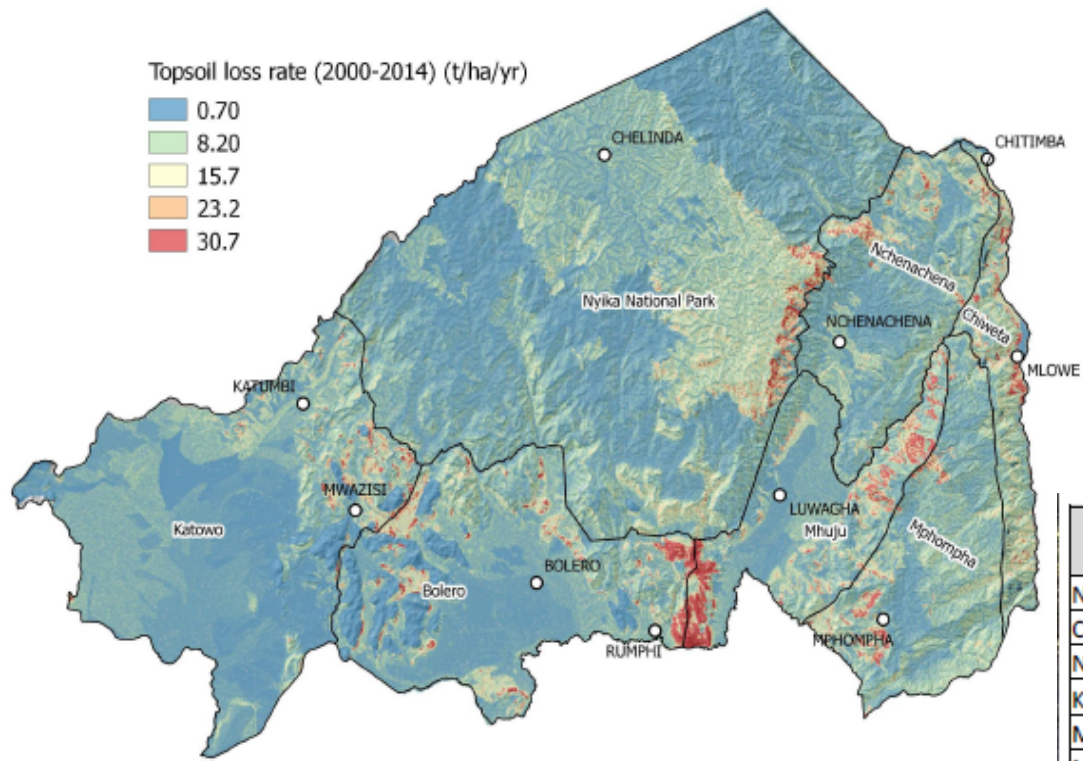
Extension Planning Area (EPA)	2014 Topsoil loss ton/ha/yr		
	Mean	Minimum	Maximum
Malosa	9.4	1.49	20.50
Chingale	8.0	0.98	14.34
Msondole	7.7	0.98	15.29
Thondwe	5.6	1.09	20.19
Mpokwa	4.6	1.03	16.31
Dzaona	4.6	1.18	19.90
Ngwelerero	4.9	1.54	19.84



RUMPHI

Topsoil loss rate

The mean district topsoil loss rate in 2014 was 10.22 t/ha/yr. Higher soil loss rates were mainly in the mountain ranges. The main factors for the soil loss rates in these areas include reduced protective vegetative cover, soil vulnerability and steep slopes. Sheet and rill erosion are the most common forms of erosion.



Extension Planning Area (EPA)	2014 Topsoil loss t/ha/yr		
	Mean	Minimum	Maximum
Nyika National Park	10.0	0.7	20.7
Chiweta	20.5	1.1	30.5
Nchenachena	10.1	0.9	25.0
Katowo	9.4	0.8	19.4
Mphompha	14.5	1.1	29.6
Mhuju	14.0	0.7	30.8
Bolero	13.0	0.1	25.0

CAUSES OF INCREASED SOIL LOSS RATES

- ✓ Poor soil management practices such as continuous carbon mining, tillage operations, exposure of bare soil to erosive rainfall, etc.
- ✓ Agricultural activities on fragile soils, particularly steep slopes
- ✓ Poor/low vegetation cover management in high risk areas
- ✓ Weak policies' -regulatory framework on implementation of sustainable land management practices.



CAUSES OF INCREASED SOIL LOSS RATES



**THANK YOU
FOR YOUR
ATTENTION**

