

**APPLICATION OF UNITED NATIONS FRAMEWORK  
CLASSIFICATION FOR FOSSIL ENERGY AND  
MINERAL RESERVES AND RESOURCES 2009: A  
CASE OF MALAWI**

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# PRESENTATION OVERVIEW

## Background Information about Malawi

- ✓ Spatial location

- ✓ Geology

- ✓ Mineral resources

## GOVERNANCE OF THE MINERAL SECTOR

- ✓ Regulatory institutional arrangement in the mineral sector

- ✓ Challenges in reporting resources and reserves

## STEPS TOWARDS ADOPTION OF UNFC 2009 IN MALAWI

- ✓ Synoptic view of mineral reserves and resources based on UNFC 2009

## CONCLUSION

# SPATIAL LOCATION

Malawi is located in the south-eastern part of Africa, within the East African Rift System, between latitudes  $9^{\circ}$  S and  $17^{\circ}$  S and longitudes  $32^{\circ}$  E and  $36^{\circ}$  E.

The country is landlocked between Mozambique to the south and east, Zambia to the west and Tanzania to the north (Figure 1).

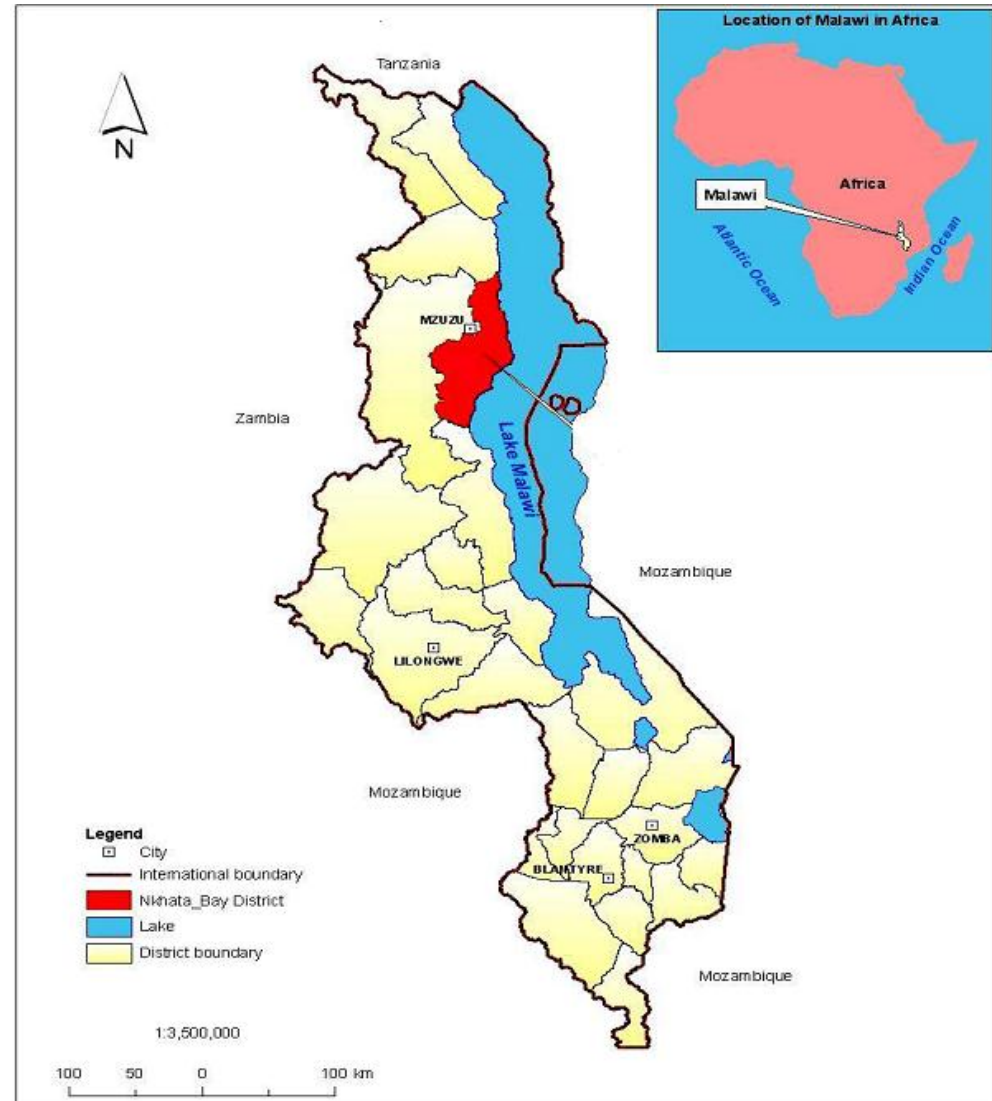


Figure 1: Location of Malawi

# GEOLOGY

□ The geology of Malawi comprises rocks that can be grouped into; Pre-Karoo, Karoo and Post-Karoo.

□ The pre-Karoo rocks cover much of the country and range in ages from late Precambrian to early Paleozoic.

□ They have been affected by three major phases of deformation and metamorphism: the Irumide, Ubendian and The Pan-African.

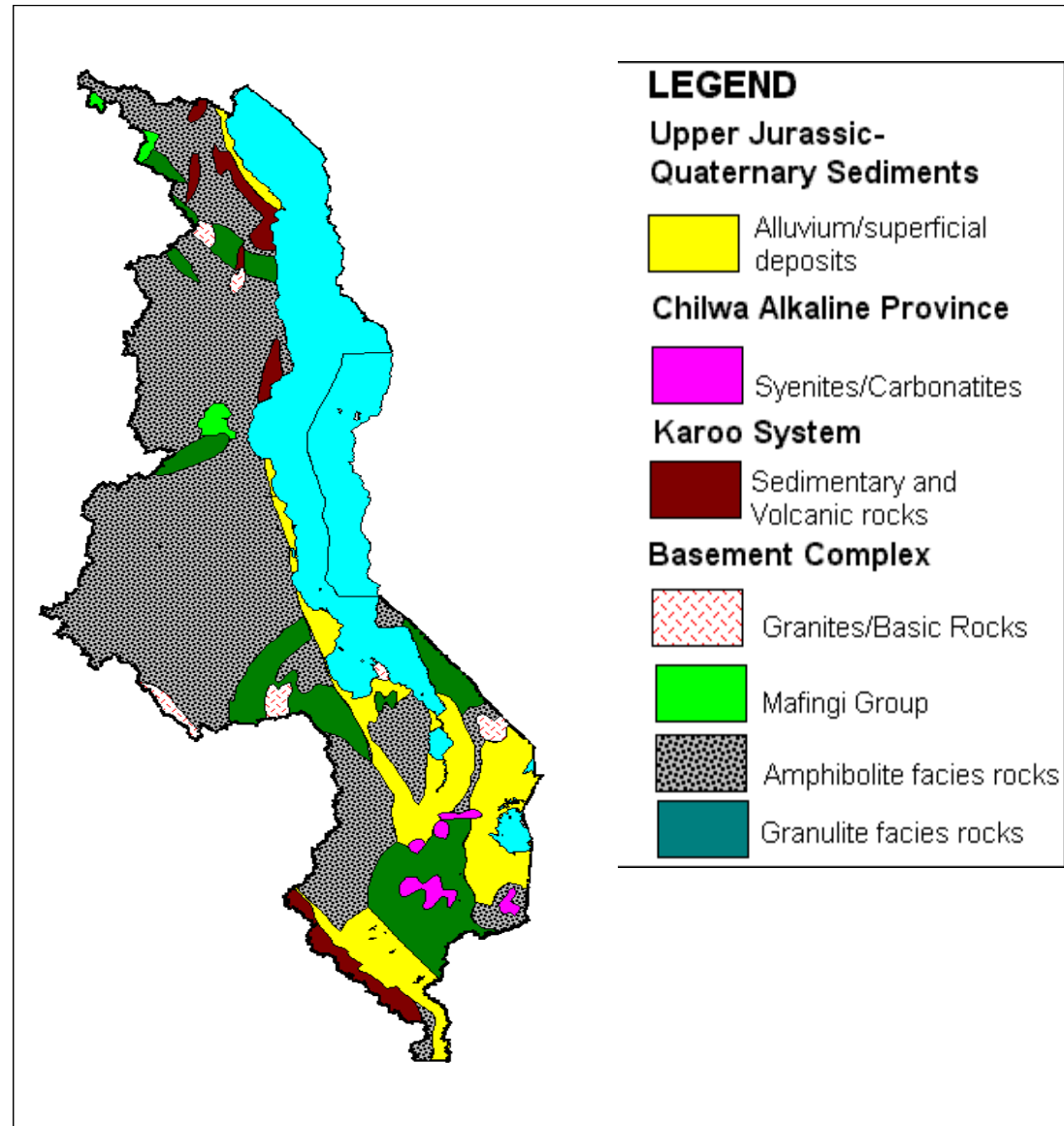


Figure 2: Geology of Malawi (GSD, 2014)

- ❑ The pre-Karoo rocks of Malawi comprise gneisses, granulites and schists of the so-called Basement Complex with associated mafic, ultramafic, syenites and granite rocks.
- ❑ Karoo and Cretaceous rocks are mainly restricted to two areas in the extreme north and extreme south of the country.
- ❑ Quaternary sediments are associated with the Karoo and Cretaceous rocks and infill areas along the lakeshore and the Rift Valley depressions.
- ❑ Plutons, volcanic vents and minor intrusions of the Chilwa Alkaline Province (late Jurassic to Cretaceous in age), preceded by upper Karoo Dolerite dyke swarms and basaltic lavas, have been intruded into the Basement Complex gneisses of southern Malawi.

## MALAWI'S MINERAL RESOURCES

- ❑ Rocks of the Basement Complex cover about 85% of the land area of the country and account for about two thirds of the mineral deposits known.
- ❑ However, it should be noted that although the Karoo and Chilwa Alkaline Province rocks occupy less than 4% of the land area, they contain mineral deposits that have the greater economic potential compared to the Basement Complex.
- ❑ The Tertiary and Quaternary deposits are also associated with some of the major residual deposits in the country.
- ❑ Coal is probably the single most important mineral known to occur in the Karoo System. Fourteen coalfields have been identified in northern Malawi and two in southern Malawi. Uranium has been discovered in Karoo sandstones of the northern region.

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**Figure 3: Kayelekera Uranium Mine in Malawi**



❑ Important mineral deposits are associated with carbonatites and Syenites of the Chilwa Alkaline Province. These include rare-earth bearing monazite and strontianites, apatite, pyrochlore and fluorite.

❑ Mineral deposits of Tertiary and Quaternary age comprise sedimentary limestone, residual clays including the important bauxite deposits of Mulanje Mountain, titanium bearing minerals in unconsolidated sediments, gypsum and silica sands. Of particular interest is the alluvial gold that is known to occur in gravels of some major rivers in Malawi.

❑ It has been concluded that the gold is derived from quartz stringers, quartz veins and reefs of the Basement Complex. However, recent exploration work by the Geological Survey Department has also revealed evidence of hydrothermally derived gold and platinum group minerals in the area.

❑ Geological structures such as shear zones, faults, joints and folds are also of interest in that they have acted as conduits or in some cases, as important hosts of mineralization.

## SOME MAJOR MINING AND MINERAL EXPLORATION PROJECTS IN MALAWI

- ❑ The following are some of the important mining and mineral exploration projects in Malawi (with focus on uranium, REE and phosphates):
- ❑ Kayelekera Uranium Mining Project (currently under care and maintenance and still processing the stockpile);
- ❑ Resource Star's Livingstonia Niobium, Uranium and REEs exploration;
- ❑ Kanyika Niobium and Uranium Exploration focusing on Uranium;
- ❑ Machinga Heavy Rare Earths, Songwe, Mt. Mulanje, Illomba and Kangankunde REEs; and,
- ❑ Tundulu Phosphates. More exploration projects are shown in Table 1.

**Table: other U and REE Mineral Exploration Projects in Malawi**

<b>MINERAL</b>	<b>AREA (Potential ore type)</b>	<b>TONNAGE (million tonnes)</b>	<b>STATUS</b>	<b>COMPANY</b>
Uranium	Mhujū (Karoo)	Not Yet Available	EPL (Early Exploration)	Globe Metals (Australia)
Uranium/ REEs	Rumphi District	Not Yet Available (Karoo)	EPL (Early Exploration)	HBKD EMWAW Mining Co. Ltd)
Uranium	Nsanje (Granitic)	Not Yet Available (Baseline study)	EPL	Orapa (UK-RSA-Zw)
Uranium	Chilumba and extension of Kayelekera and Mwankenja areas	Not yet available Drilling in progress (Karoo)	EPL (Mid Exploration)	Paladin Africa
REEs	Kangankunde	2.5Mt @ 4.2% TREO	EPL (Advanced Exploration and delineation)	Lynas Co. Ltd
REEs	Songwe	Indicated R. of 13.2 Mt grading 1.62% TREO; 6.2 Mt grading 2.05% TREO and Inferred R. AT 18.6%, 1.38% TREO	EPL (Advanced Exploration and delineation)	Mkango Resources (a Canada listed Co.)
REEs	Mt. Mulanje	Not Yet Available	EPL (Early Exploration)	JOGMEC/ Gold Canyon

## GOVERNANCE OF THE MINERAL SECTOR

- ❑ The regulatory functions of the mineral sector in Malawi currently lie under the mandate of the Ministry of Natural Resources, Energy and Mining.
  
- ❑ The Ministry is primarily in charge of mineral resources promotion and facilitates formulation of appropriate policies and legislative frameworks to foster and accelerate sustainable mineral development in the country.
  
- ❑ However, the Ministry does not participate in direct mining, unless through a government investment vehicle as proposed in the Mines and Minerals Policy.
  
- ❑ The following Government Departments fall under this Ministry:-
  - (i) Department of Mines : for promotion of sustainable mining practices
  - (ii) Geological Survey : to facilitate sustainable mineral exploration
  - (iii) Office of Commissioner of Mines and Minerals: for administration of mining legislations in the country.

## **CHALLENGES IN REPORTING MINERAL RESERVES AND RESOURCES IN MALAWI**

- ❑ Currently, Malawi has no mandatory standard reporting system that ensures uniformity and consistency in reporting her mineral reserves and reserves.
- ❑ Companies use the mineral reporting systems most favorable to them e.g. JORC Code and Canadian National Instrument 43-101 . For instance; Paladin Africa Limited uses JORC code for reporting U exploration results, and Mkango Resources Co. Ltd uses Canadian National Instrument (NI) 43-101 to report REE exploration results.
- ❑ Consequently, there has been inadvertent inconsistency and non-uniformity in the reporting of mineral resources and reserves in the country by stakeholders.
- ❑ Notwithstanding this circumstance, the Government recognizes the need to harmonize mineral resource inventories developed using different mineral classification systems in order to come up with a much clearer and unified estimate of the country's mineral resources and reserves, for easy interpretation by stakeholders and use for consistent and uniform resource reporting to relevant international bodies.

## STEPS TOWARDS ADOPTION OF UNFC -2009 FOR CLASSIFICATION OF RESOURCES IN THE COUNTRY

□ Government has internally been discussing the need to have one uniform reporting system for mineral resources and reserves for easy interpretation by stakeholders and for uniform and consistent reporting of the resource and reserve estimates to relevant local and international bodies ;

➤ One of the priority classification systems under consideration is UNFC-2009. This follows the briefing of the management in the ministry responsible for mining matters by Government officers who have been participating in international workshops on UNFC 2009 magnanimously supported by IAEA on the importance of adopting this universally acceptable and internationally applicable resource classification and reporting system.

➤ The Government, currently, envisages adoption of UNFC-2009 to begin as a national mineral sector policy to be followed by its legislation as a preferred classification system for fossil energy and mineral resources and reserves in the country.

## **WHY UNFC-2009 IS CONSIDERED ONE OF THE PRIORITY CLASSIFICATION SYSTEMS**

- ❑ universal mineral classification system with a broader resource coverage than other classification systems (includes both non-commercial and undiscovered resources);
- ❑ a generic classification system which can coexist with existing industry- and country-classification systems and is not intended to replace them;
- ❑ has numerous advantages over other existing classification systems as it has a more robust resource characterization ability as it has combined important resource characterization features from other systems bridged to it e.g. CRIRSCO.
- ❑ offers an opportunity to harmonize existing reserves and resources classifications, in response to the integration of financial and extractive activities worldwide.
- ❑ It provides a single framework on which to build international energy and mineral studies, analyze government resource management policies, plan industrial processes and allocate capital efficiently.
- ❑ paves the way for improved global communications which will aid stability and security of supplies, governed by fewer and more widely understood rules and guidelines.

## MALAWI UNFC 2009 APPLICATION EXAMPLE (USING BASIC UNFC SPECS)

No	Area/Deposit	Operator	Quantities (tU)	Av Grade %U	UNFC-2009 Class	UNFC-2009 Sub-Class	UNFC-2009 Categories			Remarks
							E	F	G	
1	Kayelekera - I	Paladin Africa Ltd	5392	0.075 – 0.099	Commercial Project	On Production	1	1	1	In Care and Maintenance from early 2014 due to fall in market demand Effective Date: June, 2014 [5]
2	Kayalekera – II	Paladin Africa Ltd	11030	0.053-0.086	Potentially Commercial Project	Development Pending	2	2.1	1,2,3	Effective Date: June, 2014 [5]
3	Kanika	Globe Metals and Mining	4632	0.0059-0.0093	Potentially Commercial Project	Development Pending	2	2.1	1,2,3	Recovery of uranium unclarified Effective Date: Jan 10, 2013 [6][7]
4	Livingstonia and Chombe	Resource Star	2308	0.028	Potentially Commercial Project	Development on Hold	2	2.2	3	Effective Date: June 22, 2011 [8]
5	Illomba	Resource Star	-	-	Exploration Project		3	3	4	
6	Machinga	Globe Metals and Mining	-	-	Exploration Project		3	3	4	



## MALAWI UNFC 2009 continued...

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							E	F	G	
7	Mhuju	Globe Metals and Mining	-	-	Exploratio n Project		3	3	4	
8	Songwe	Mkango Resources	-	-	Exploratio n Project		3	3	4	
9	Tambani	Mkango Resources	-	-	Exploratio n Project		3	3	4	
10	Nsanje	Orapa	-	-	Exploratio n Project		3	3	4	
11	Rumphi District	HBDK EMWAW Mining Co	-	-	Exploratio n Project		3	3	4	
12	Chilumba and Extensions of Kayelelera and Mwankenja	Paladin Africa Ltd	-	-	Exploratio n Project		3	3	4	

## CONCLUSION

- ❑ Malawi welcomes the adoption of UNFC as a vital instrument to be used for:-
  - (i) national and international energy and mineral studies;
  - (ii) Government mineral resources management;
  - (iii) Mining industry business process management; and
  - (iv) Mineral financial reporting.
  
- ❑The Government currently envisages the adoption of UNFC as a preferred classification system for classifying and reporting mineral resources and reserves to commence at a national policy level prior to its legislation – good enough, the Mines and Mineral Policy will be reviewed soon where such issues will be discussed.
  
- ❑There is need for country-wide mineral sector stakeholder sensitization on the importance of adopting UNFC-2009 as an internationally acceptable and national uniform reporting system for classification of mineral resources and reserves to prevent creation of unwarranted panic and misrepresentation of facts adherent to UNFC among mineral sector stakeholders in the country .
  
- ❑There is also need for continued capacity building on UNFC-2009 at national level

**THANK YOU FOR YOUR ATTENTION!**