



Potential for Land Use Carbon in Africa

Jonathan Haskett

Carbon benefits from Sequestration
and Reduced Emissions



Sequestration of Carbon Through Land Use

- Mechanisms:
 - Active uptake of carbon via tree – planting
 - Active uptake of carbon via increased productivity
 - Active uptake of carbon via soil sequestration
- Benefits
 - Creating new livelihood opportunities and a broader, more diverse economic base
 - Helping communities to adapt to climate change
 - Increasing biodiversity
 - Helping to mitigate global climate change
 - Reversing land degradation



CDM is a Way to Assess Sequestration Potential

- The Kyoto Protocol's Clean Development Mechanism (CDM) includes land use carbon sequestration through afforestation and reforestation (but not forest conservation) in its Agriculture Forestry and Other Land Uses (AFOLU) category
- The CDM is a rigorous standard
- Excludes recently deforested areas
- Following analysis includes climatically favorable areas for tree planting.



Criteria for Determining CDM A/R Areas

- Areas with Aridity Index (AI) lower than : ($AI < 0.65$) excluded
 - *Aridity Index (AI) = mean annual precipitation / mean annual evapotranspiration*
- Areas above 3500 meters and/or timberline excluded
- Areas classified as urban, water bodies, or various types of tundra excluded
- Areas classified as irrigated or under other intensive agricultural production, assuming that these areas are already in high value production, or their conversion may impact on food security excluded
- Recently deforested areas, as per guidelines that exclude recently deforested areas from CDM-AR (USGS 1993 Landuse Classification) excluded
- Recently reforested areas (USGS 1993 Landuse Classification, MODIS Satellite data) excluded
- National thresholds for crown cover, tree height and minimum land area used



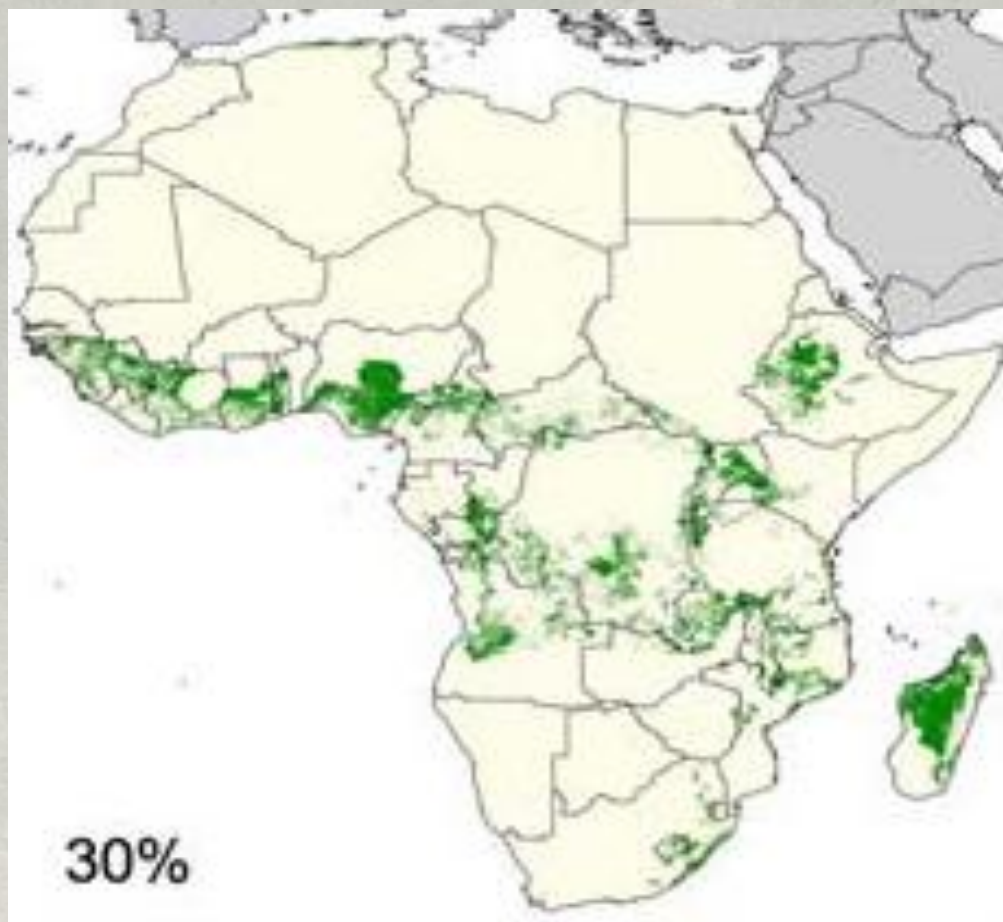
Estimating Sequestration Potential

- Following the IPCC "Land Use, Land-Use Change, and Forestry" report section - "4.4.4.1.3. Difference in stocks between agroforestry and common practices" approximately 50 tC/ha is sequestered when degraded lands are successfully converted to agroforestry.
- Degraded land converted to community forestry will often sequester more but 50tC/ha is a reasonably conservative approximation
- tC can then be converted to tCO₂e (the carbon market's trade-able unit) by multiplying by 3.67



CDM AFOLU Potential Africa

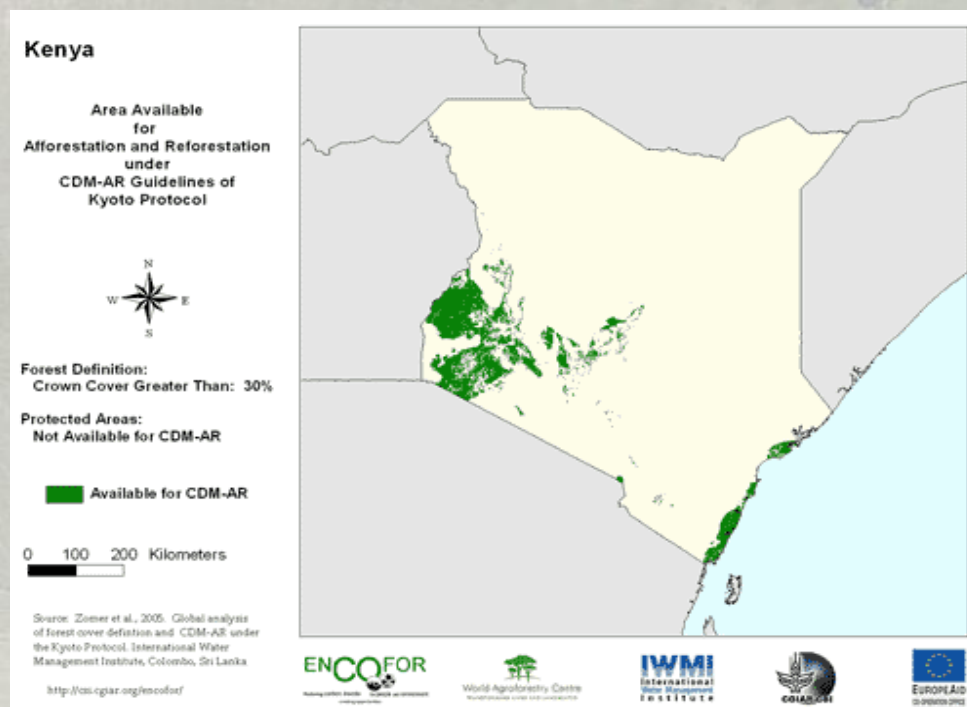
Forest Definition: Crown Cover greater than 30%



From :
Zomer et al. Mitig Adapt
Strateg Glob Change (2008)
13:219–239



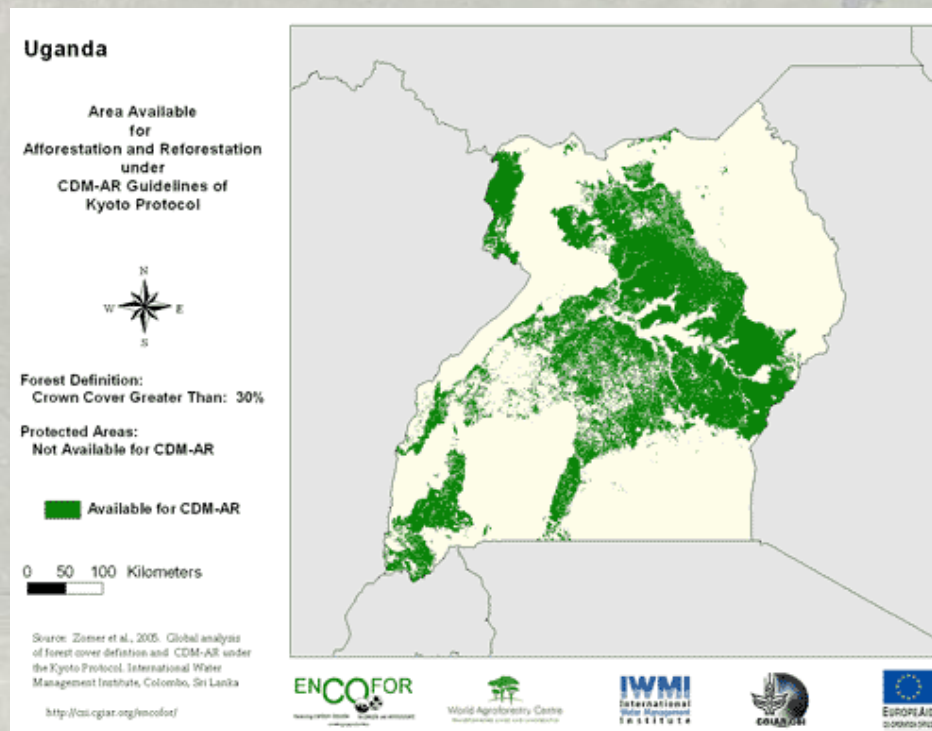
Kenya CDM AFOLU Potential



Country	CDM AR Area sq km	CDM AR Area hectares	Agroforestry sequestration t C (50tC/ha)	Agroforestry sequestration t CO ₂ e
Kenya	33,259	3,325,900	166,295,000	610,302,650



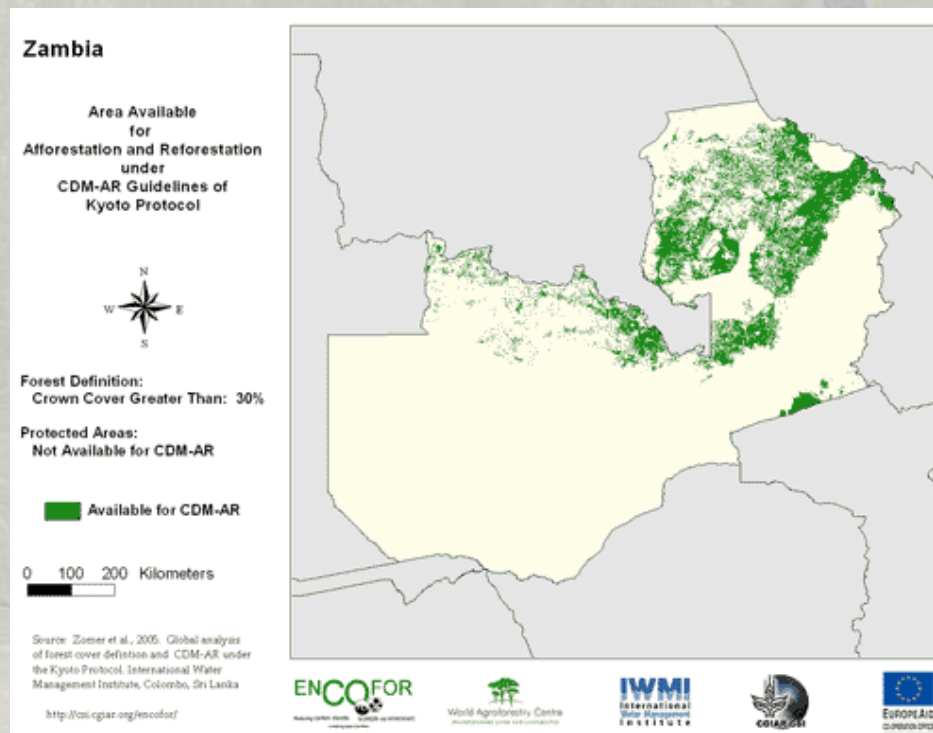
Uganda CDM AFOLU Potential



Country	CDM AR Area sq km	CDM AR Area hectares	Agroforestry sequestration t C (50tC/ha)	Agroforestry sequestration t CO ₂ e
Uganda	69,266	6,926,600	346,330,000	1,271,031,100



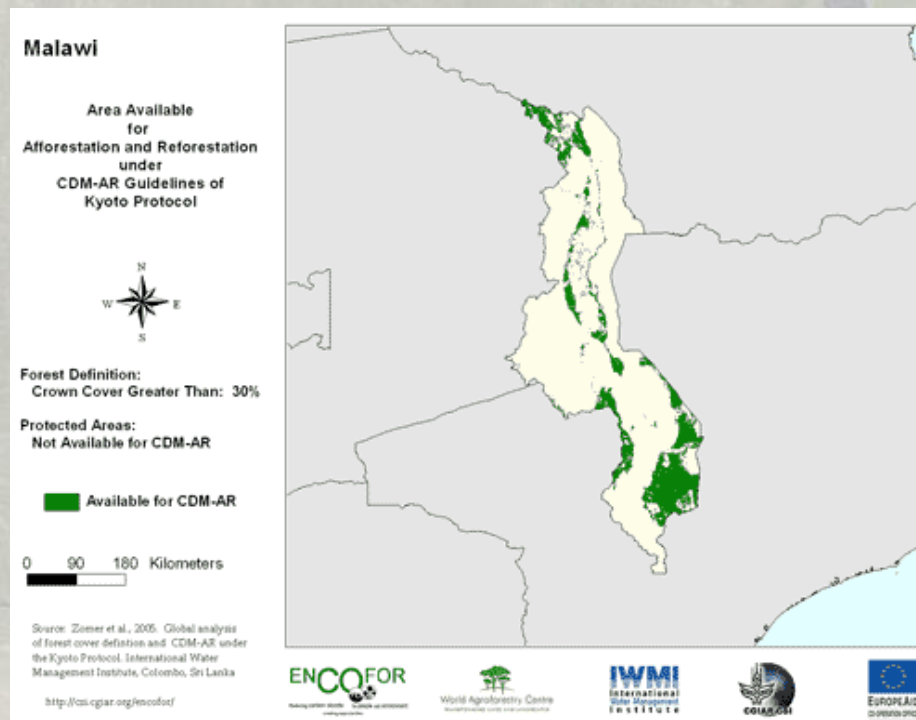
Zambia CDM AFOLU Potential



Country	CDM AR Area sq km	CDM AR Area hectares	Agroforestry sequestration t C (50tC/ha)	Agroforestry sequestration t CO ₂ e
Zambia	73,638	7,363,800	368,190,000	1,351,257,300



Malawi CDM AFOLU Potential



Country	CDM AR Area sq km	CDM AR Area hectares	Agroforestry sequestration t C (50tC/ha)	Agroforestry sequestration t CO ₂ e
Malawi	19,250	1,925,000	96,250,000	353,237,500



Reduced Emissions from Deforestation and Degradation(REDD)

- Not currently included in the Kyoto framework but is on the agenda for future climate agreements as agreed to at the COP 13 climate meetings in Bali
- Provides credits for maintaining standing forests by reducing the rate of deforestation



Rates of Deforestation

Changes in the extent of Forest (Global Forest Resources Assessment 2005 FAO)

	Area (1000 ha)			Annual Change Rate			
	1990	2000	2005	1990-2000		2000-2005	
Country				1000 ha/yr	%	1000 ha/yr	%
Kenya	3708	3582	3522	-13	-0.3	-12	-0.3
Uganda	4924	4059	3627	-86	-1.9	-86	2.2
Zambia	49124	44676	42452	-445	-0.9	-445	-1.0
Malawi	3896	3567	3402	-33	-0.9	-33	-0.9

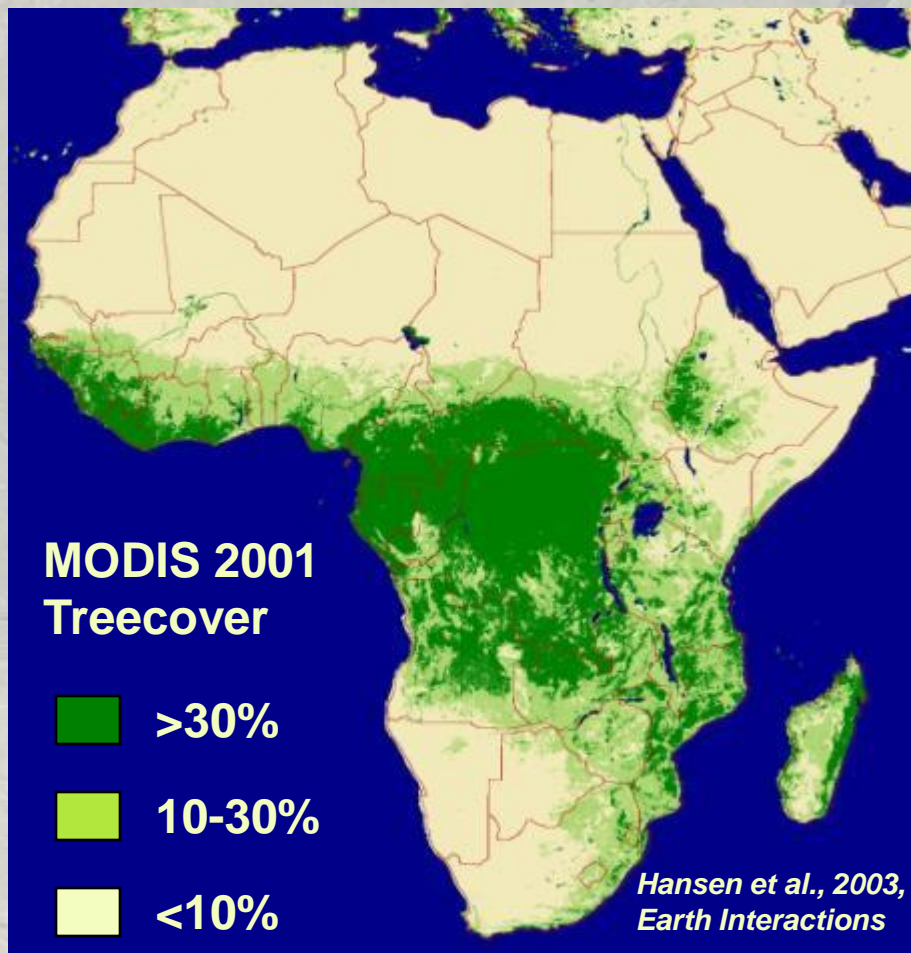


Estimation of REDD Potential

- Forest cover areas are derived from MODIS satellite imagery and WRI database
- Carbon content of forests are highly variable especially in the tropics
- Carbon in tC/ha is estimated as equivalent to agroforestry or 50 tC/ha in standing forests (a conservative estimate in many cases)
- Assuming that Natural forest is the area available for REDD if the final agreement credits standing forests as well as deforestation rates



Forest Area - Africa





Kenya Forest



Country	Natural Forest sq km	Natural Forest ha	Standing Forest Carbon tC (50tC/ha)	Standing Forest Carbon tCO2e
Kenya	168,650	16,865,000	843,250,000	3,094,727,500



Uganda Forest



Country	Natural Forest sq km	Natural Forest ha	Standing Forest Carbon tC (50tC/ha)	Standing Forest Carbon tCO2e
Uganda	4,1470	4,147,000	207,350,000	760,974,500



Zambia Forest



Country	Natural Forest sq km	Natural Forest ha	Standing Forest Carbon tC (50tC/ha)	Standing Forest Carbon tCO ₂ e
Zambia	311,710	31,171,000	1,558,550,000	5,719,878,500



Malawi Forest



Country	Natural Forest sq km	Natural Forest ha	Standing Forest Carbon tC (50tC/ha)	Standing Forest Carbon tCO2e
Uganda	4,1470	4,147,000	207,350,000	760,974,500



Conclusions

There is significant potential in Africa and specifically in COMESA Countries to participate in global carbon markets both through sequestration and through avoided deforestation.