Biofuels in Africa – is Africa different?

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CSIR-Natural Resources and Environment

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Forest Biofuels: A Green Resource?

Ingwenyama Sports & Conference Resort, White River, Mpumalanga

our future through science

Overview

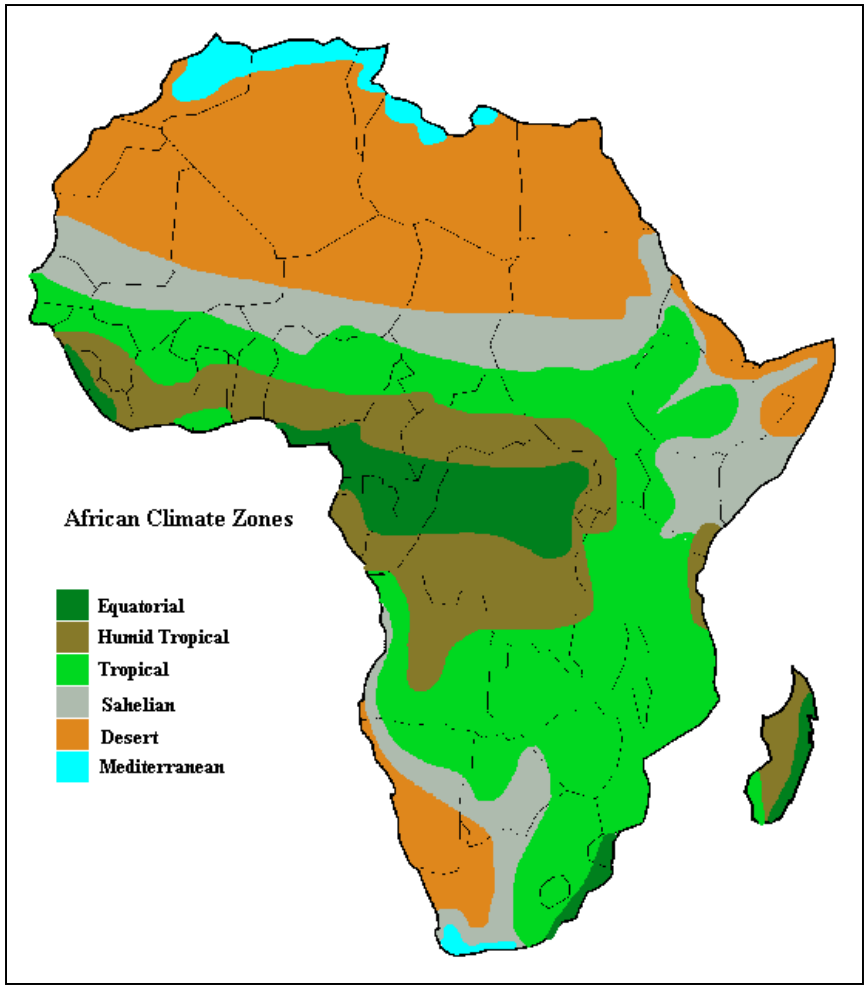
- Drivers of biofuel expansion – an African perspective
  - Why Africa?
  - What do policy makers want?
- Current progress
- Sustainability concerns

Comparative size and population

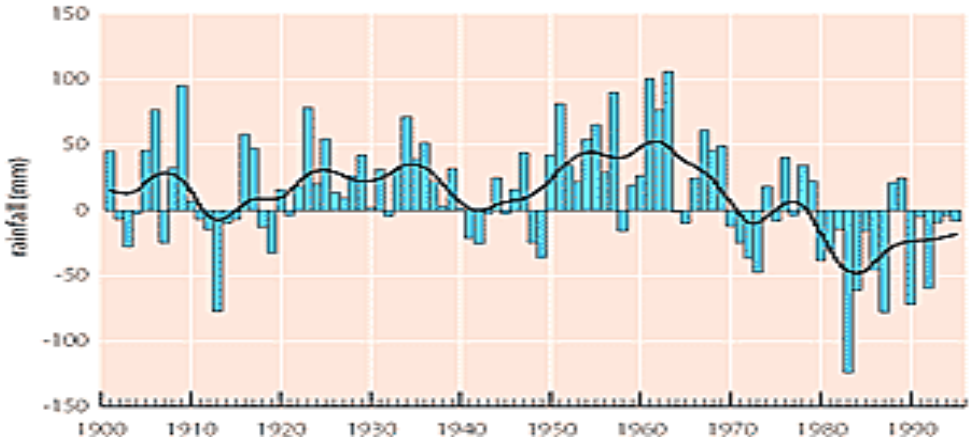
Africa	Area in km2	Population in million
	30 300 000	**728**

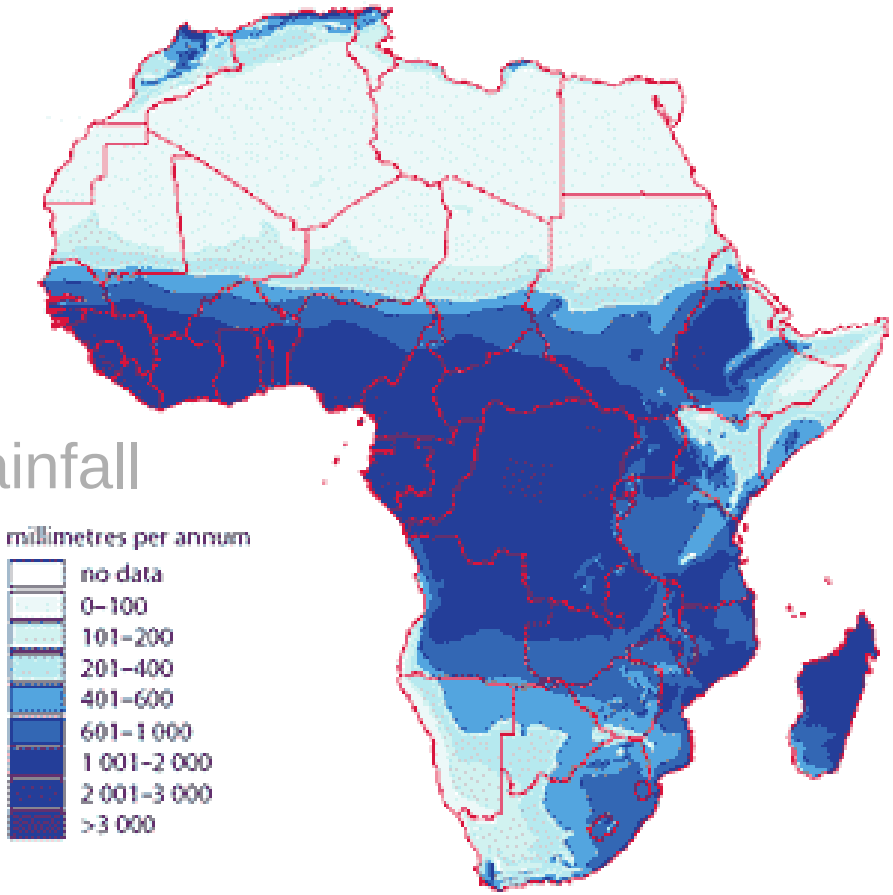
Other countries	Area in km2	Population in million
China	9 800 000	1 300
USA	9 800 000	298
Europe	3 800 000	727
India	3 200 000	1 100
Total	**26 600 000**	**3 425**

Brazil	8 500 000	191

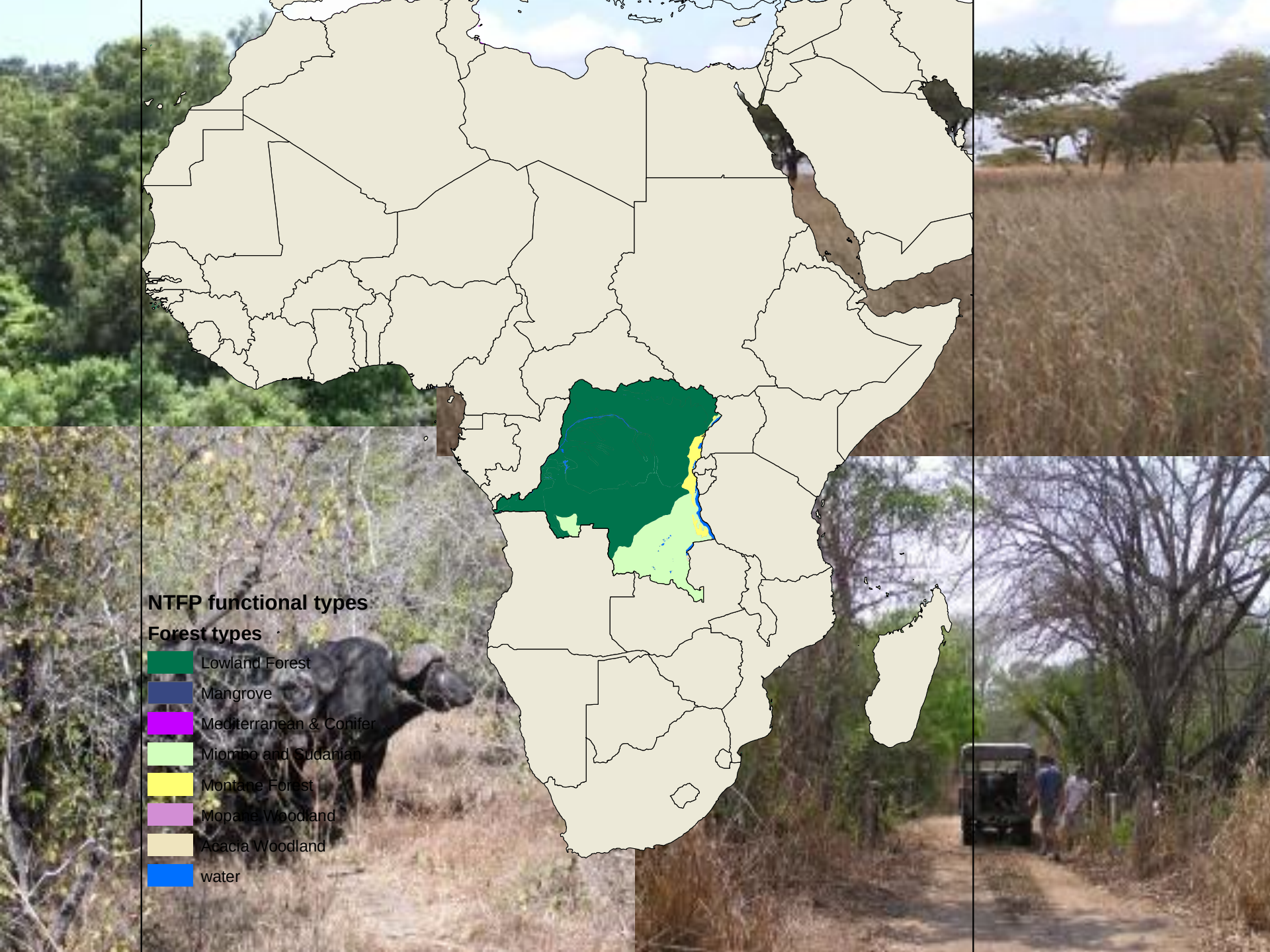


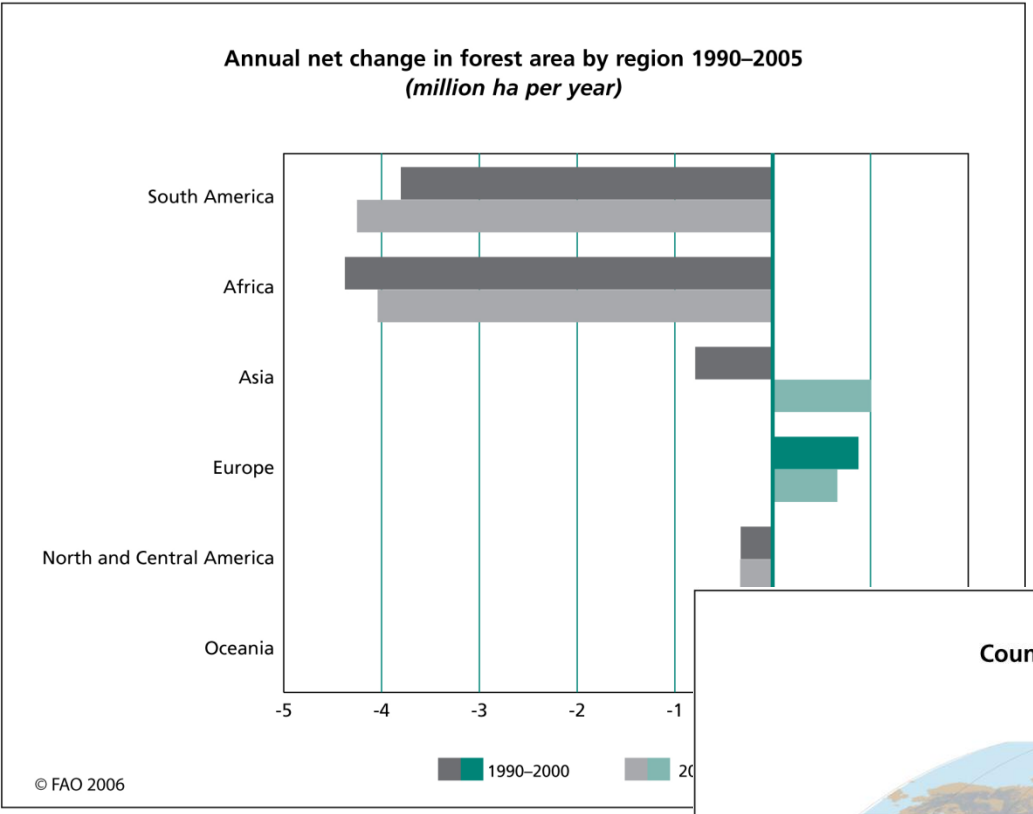
Ecoregions

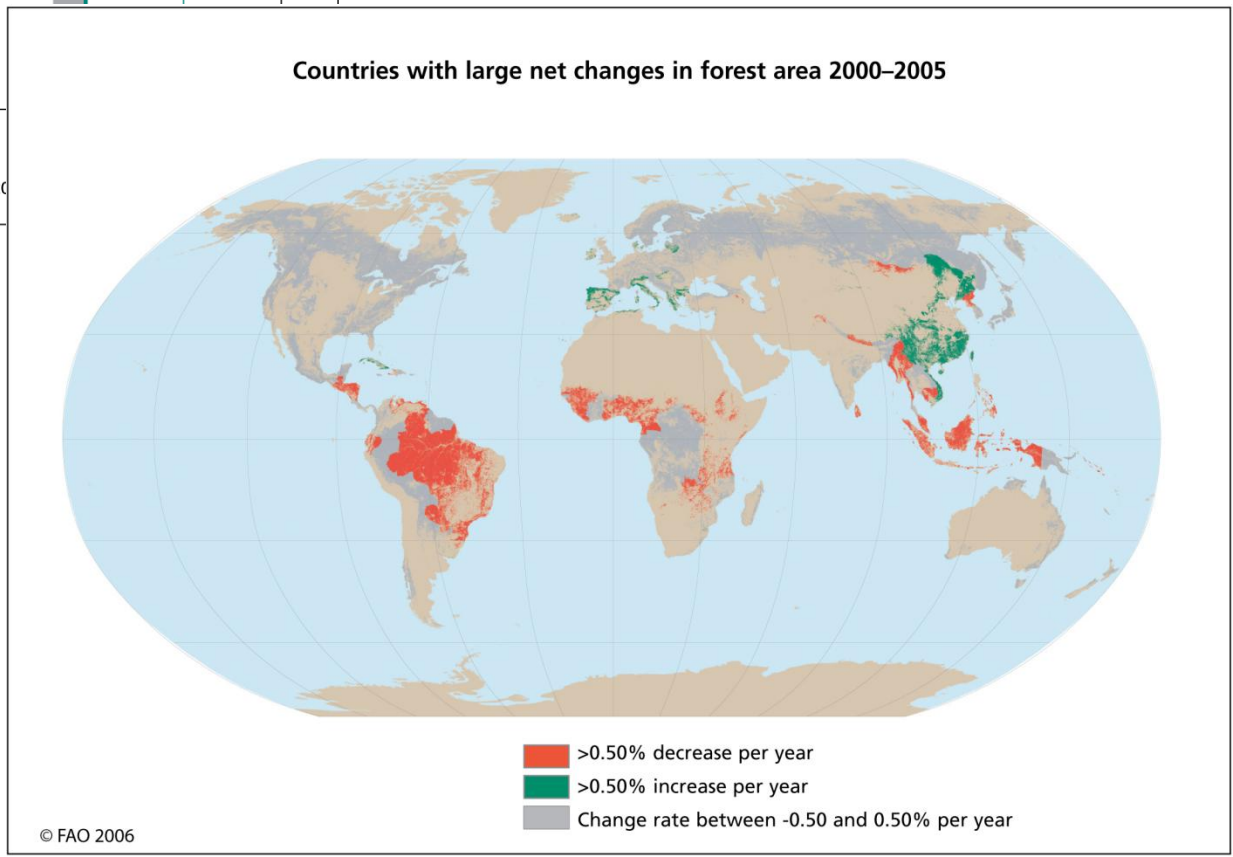


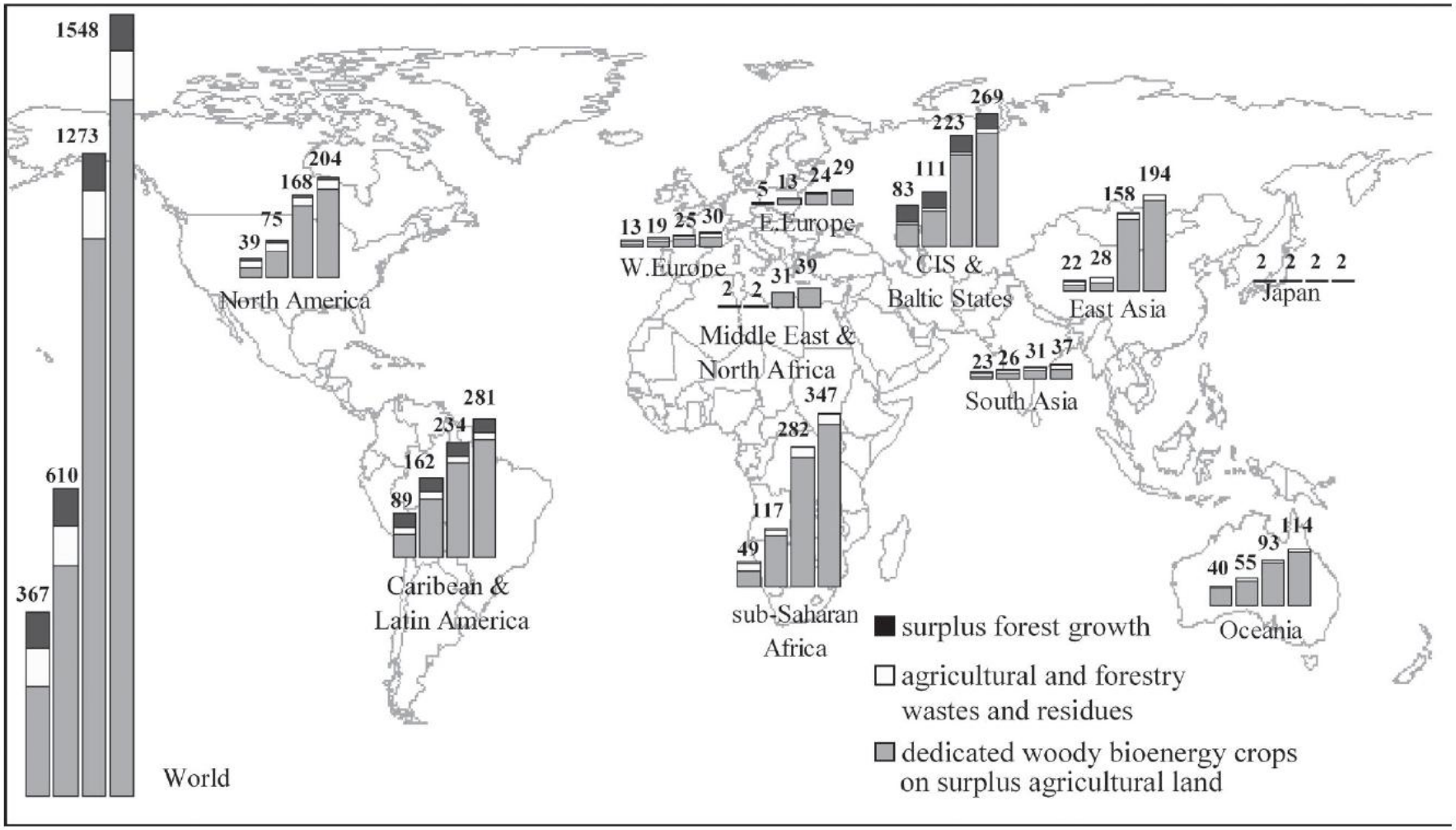


Rainfall


NTFP functional types
Forest types
Lowland Forest
Mangrove
Mediterranean & Conifer
Miombo and Sudanian
Montane Forest
Mopane Woodland
Acacia Woodland
water


Annual net change in forest area by region 1990–2005
(million ha per year)
South America
Africa
Asia
Europe
North and Central America
Oceania
-5
-4
-3
-2
-1
1990–2000
© FAO 2006


Countries with large net changes in forest area 2000–2005
>0.50% decrease per year
>0.50% increase per year
Change rate between -0.50 and 0.50% per year
© FAO 2006



Smeets 2004

Values in EJ/jr

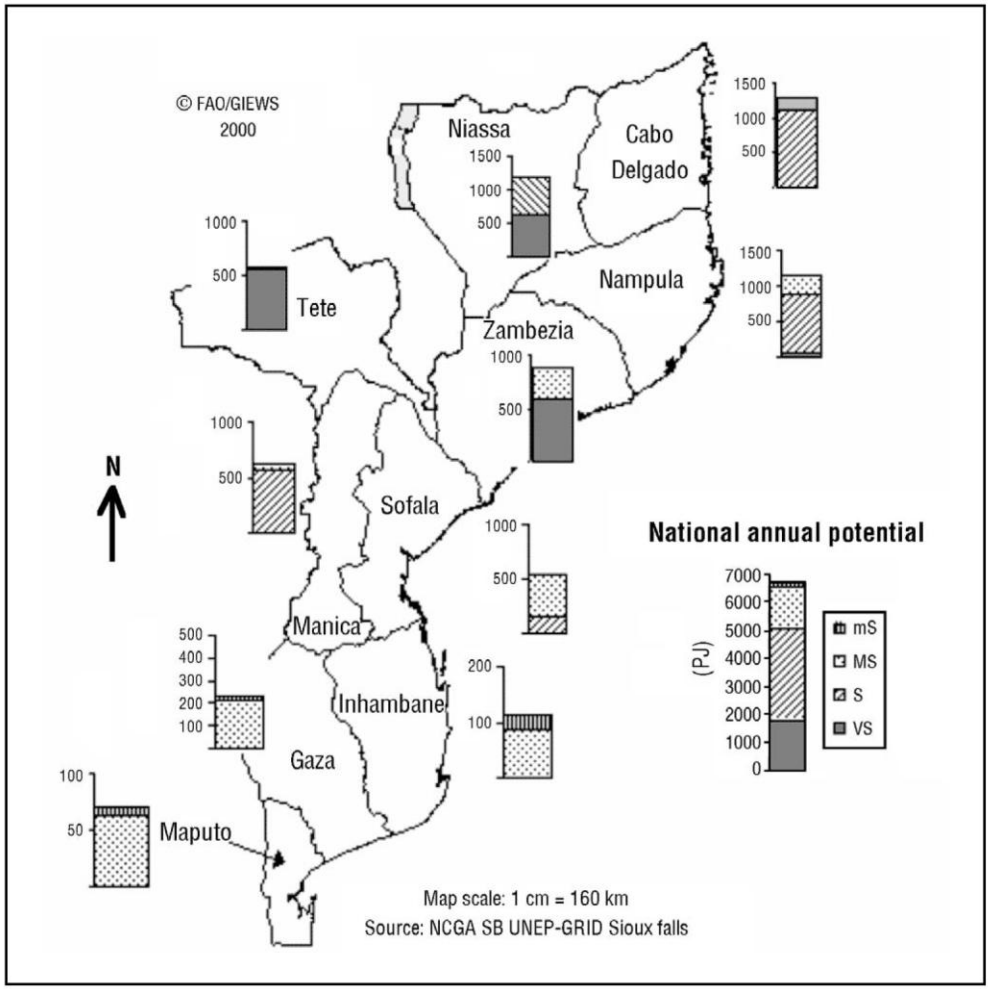


Figure 6. Regional biomass annual production potential in Mozambique (PJ) (2015)

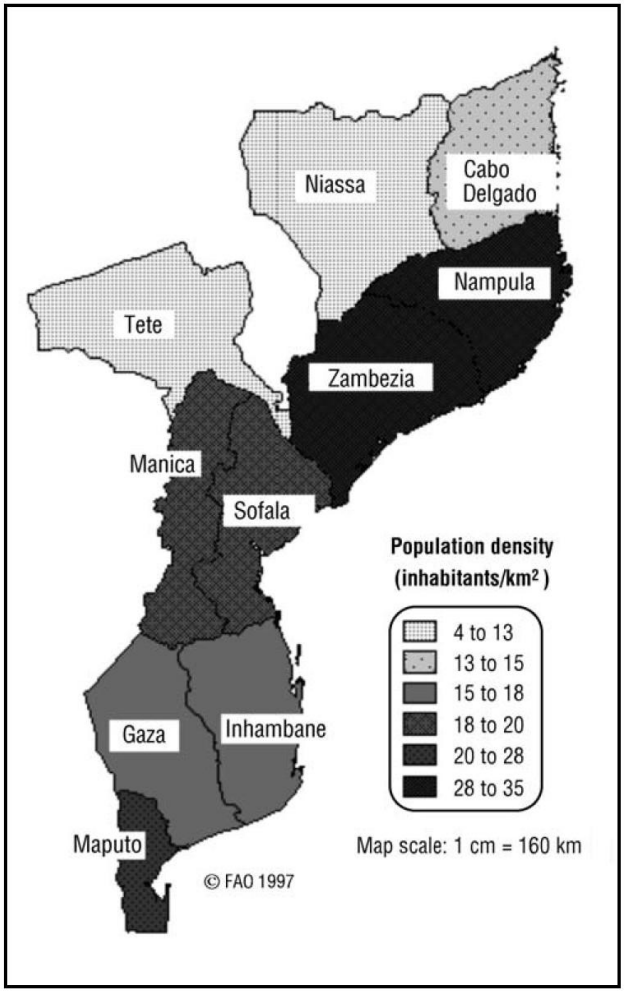


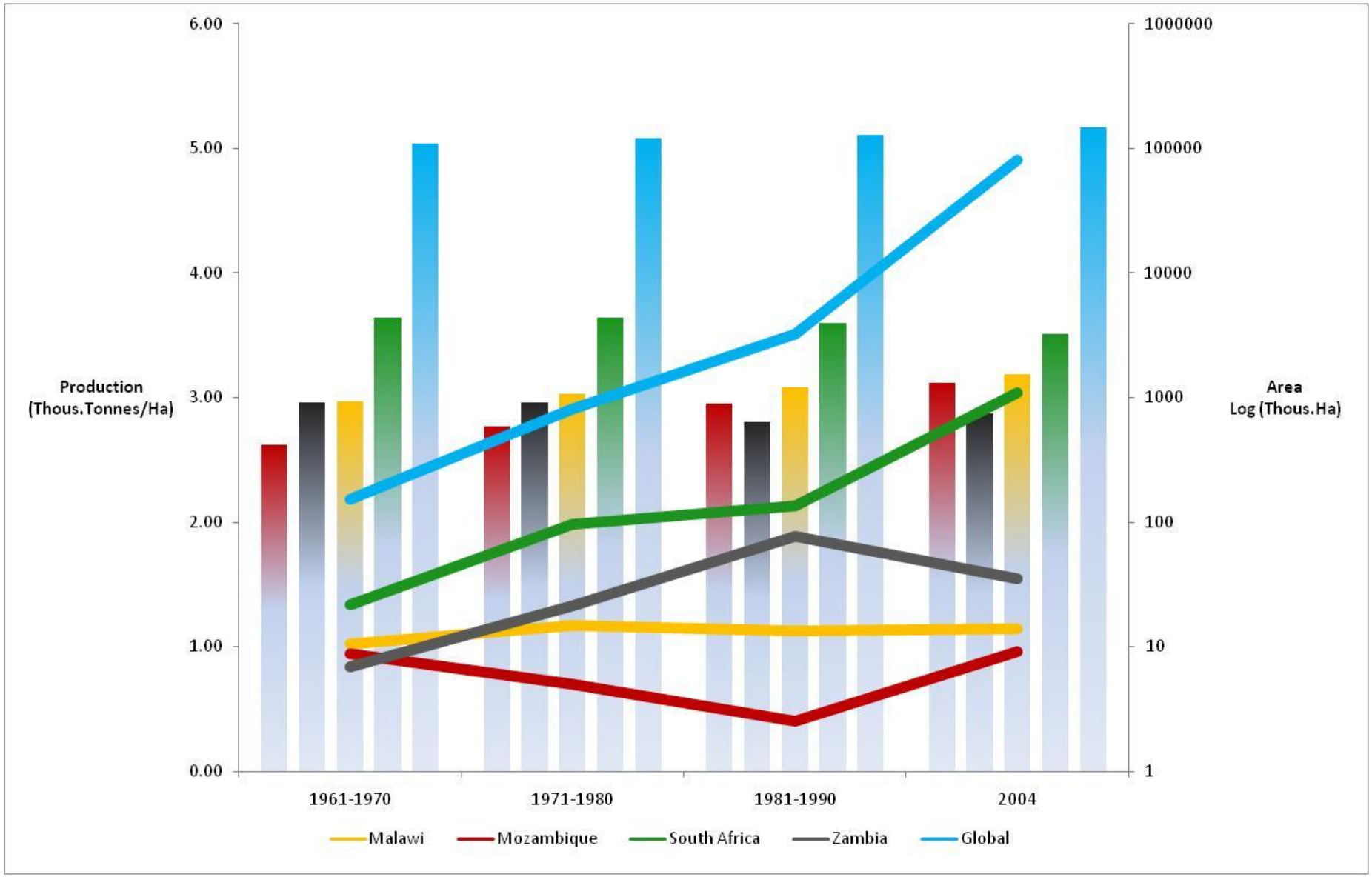
Figure 1. Regional population density distribution in Mozambique by province

Source: FAO/GIEWS, 2005

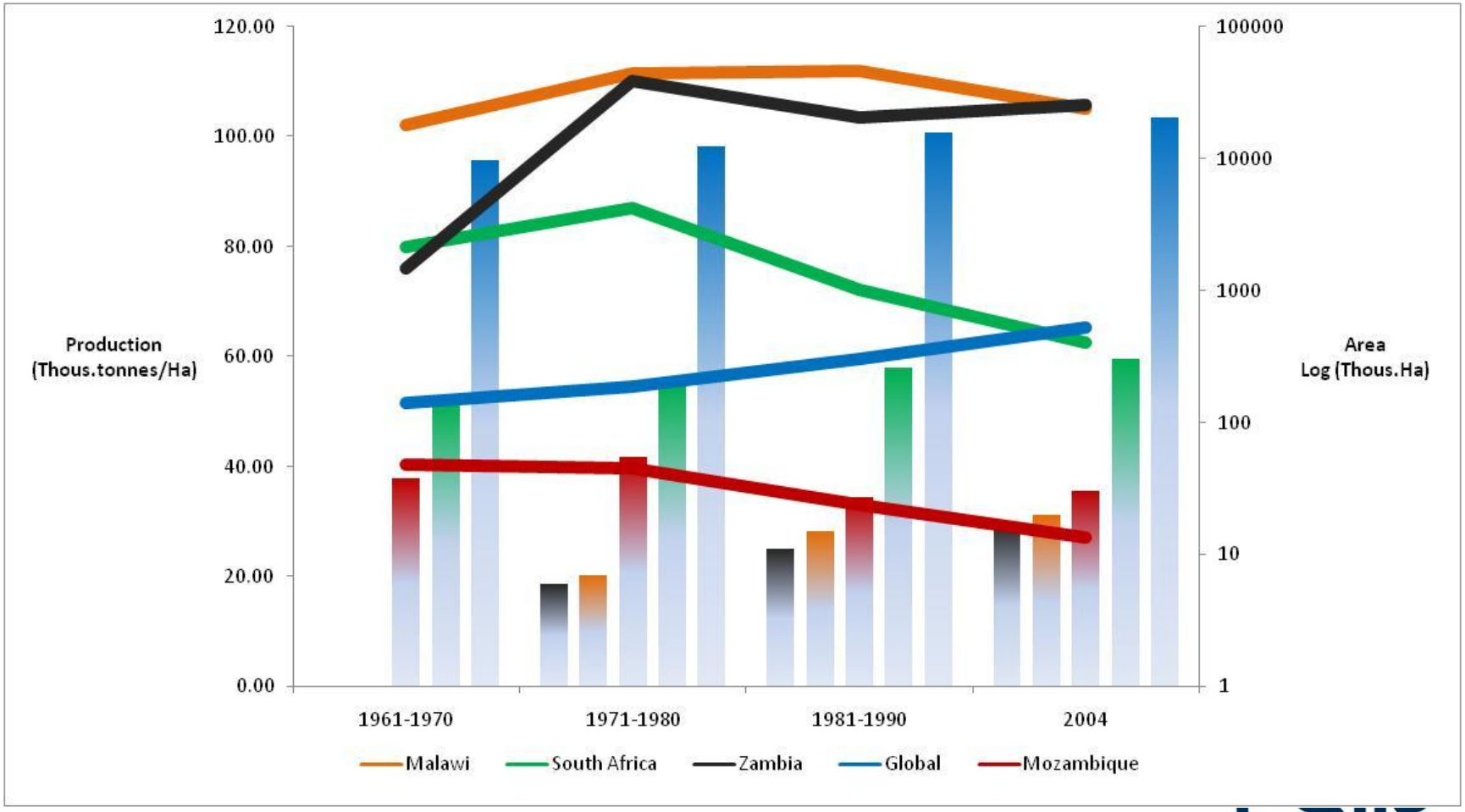
70% of population less than poverty line
40% less 1$ per day
80 % of population in agriculture
Only ~ 18% of agriculture land used
10 – 48 million ha of potential agricultural land (deforestation?)

Batidzirai, Faaij and Smeets 2006

Agricultural efficiency: Maize

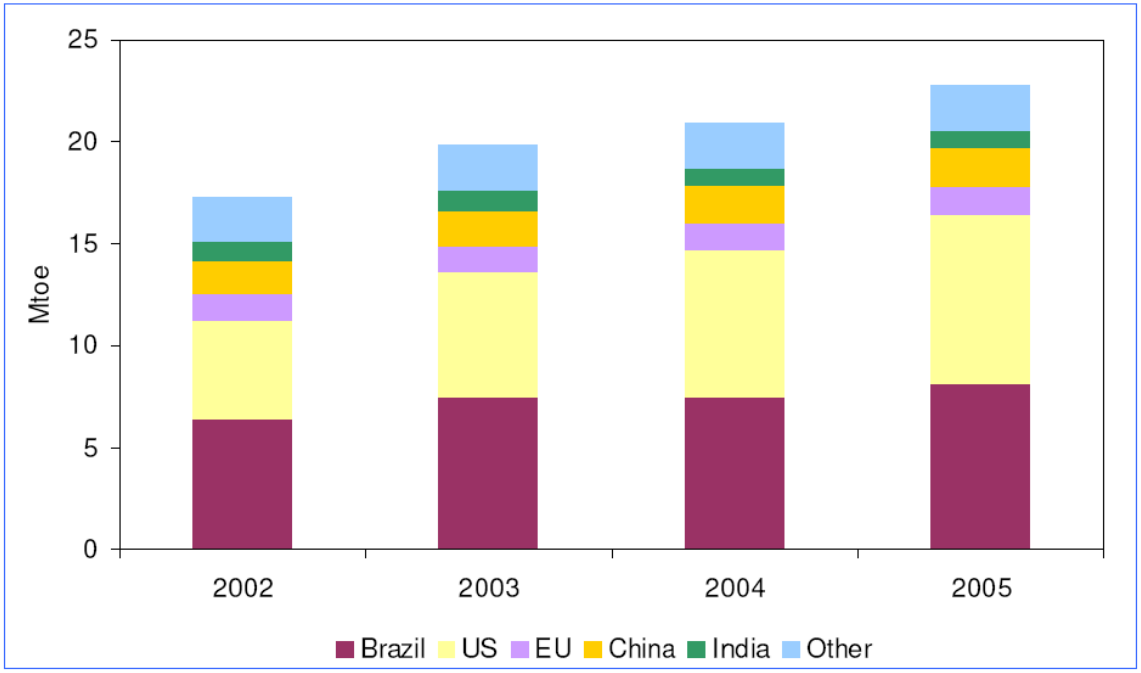


Agricultural efficiency: Sugar

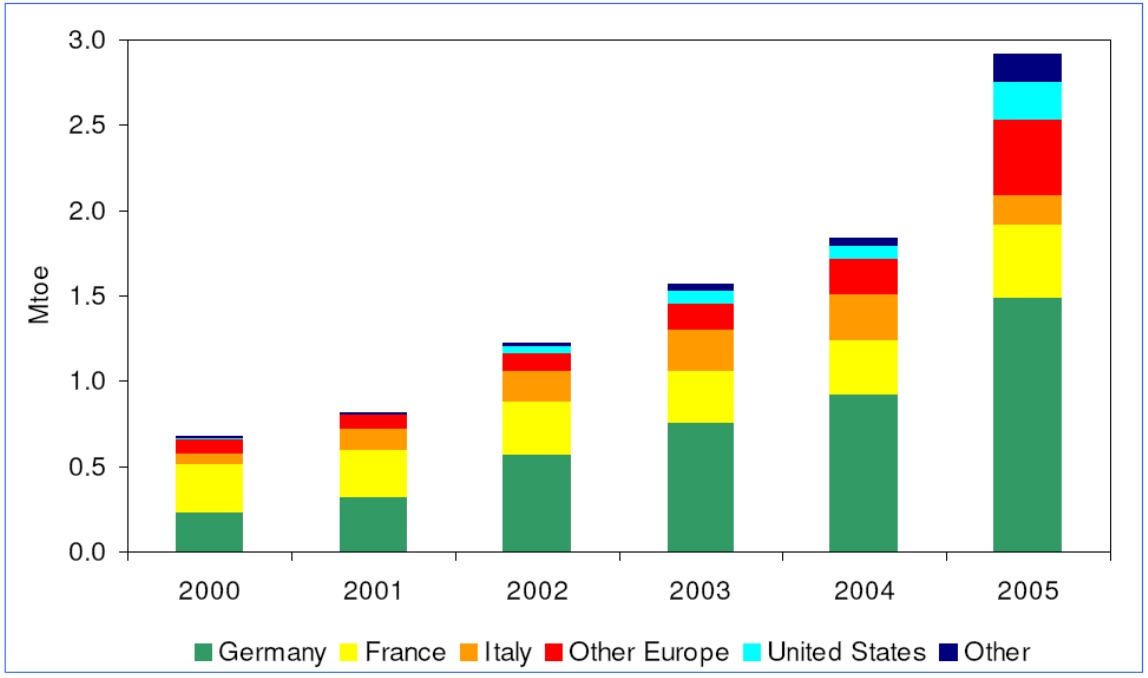


Biofuel use

- 80-90 % of poor HH use wood or charcoal as main energy source
- 0.1 tonne Carbon/y, which contrasts with the world average of 1 tC/y, the European average of about 2.5 tC/y and the United States of 5.5 tC/y **(EIA, 2000).**



Global bioethonal



Global biodiesel

Faaij 2007

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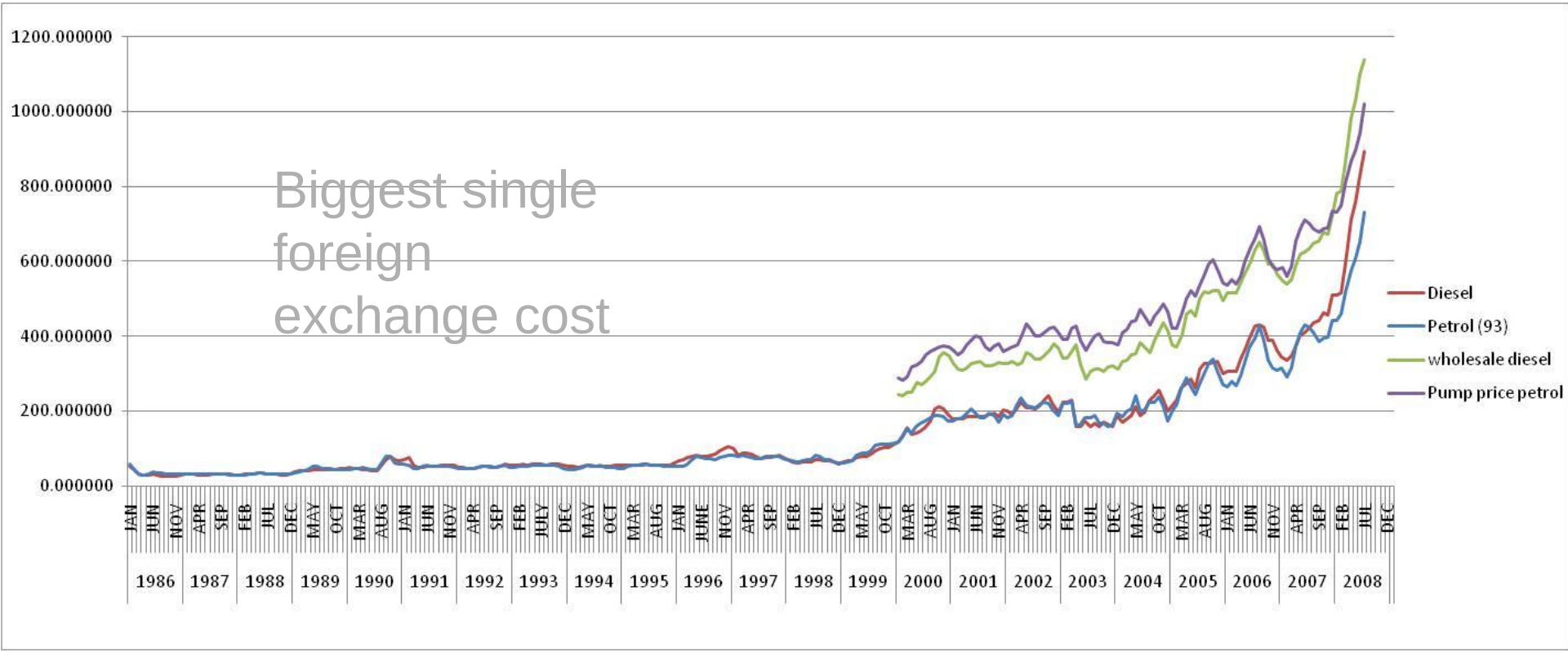
Why the sudden interest in biofuel in Africa?

Africa is being suggested as the potentia OPEC of biofuel

New wave of land grabs

- Large market opened due to demand for biofuels in Europe (huge impact)
- Concerns over global warming (small impact)
- Seen as mechanism for bringing income to commercial farmers (big impact from commercial farmer and industry sector)
- Means to drive rural development (big impact government)
- Means to drive economy (big impact some governments)
- Means to make money (Big impact commercial sector)
- Fuel security (big impact some governments)

Drivers of biofuel expansion

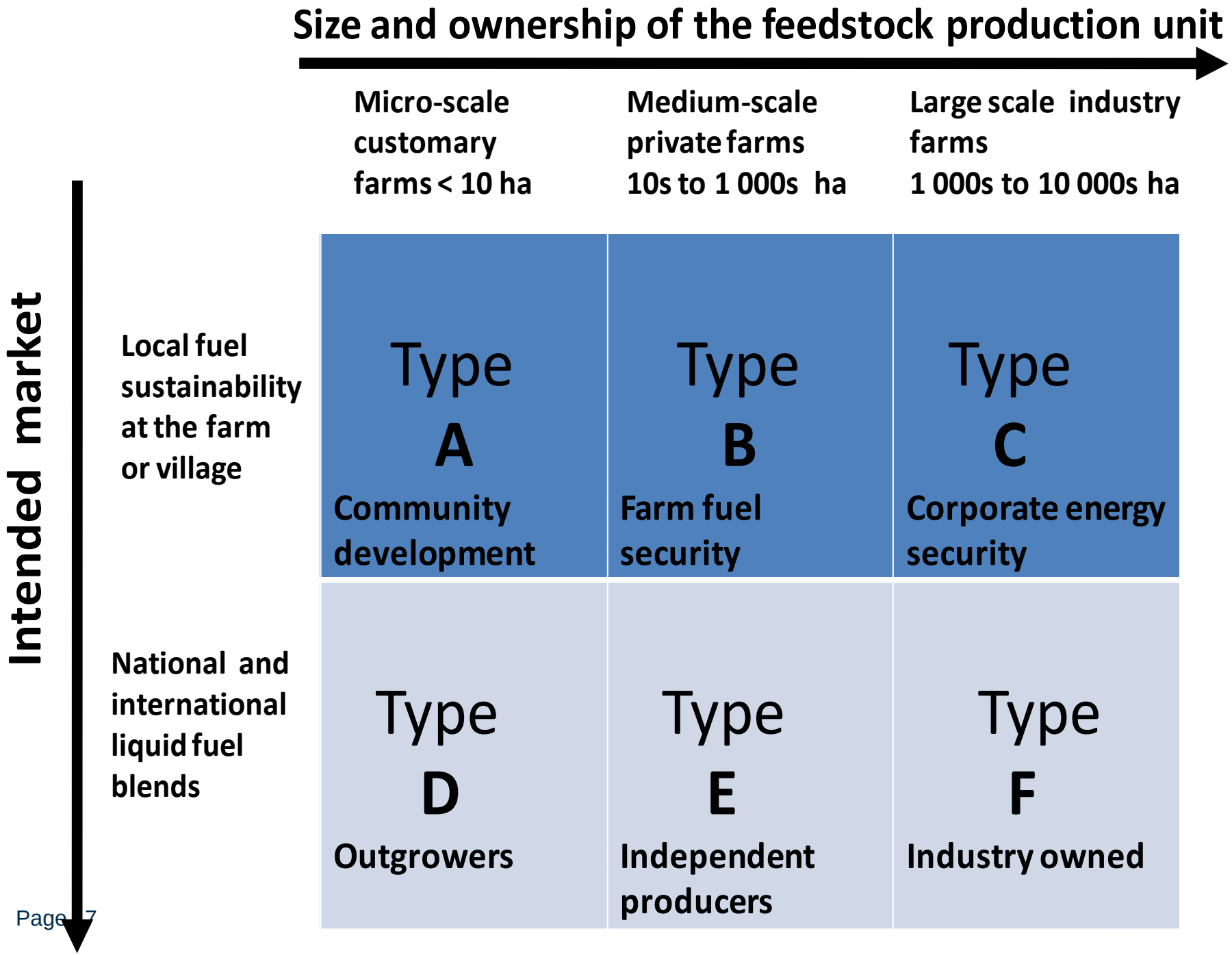


Basic fuel price and pump price for petrol and diesel in South Africa (per litre)

	South Africa	Mozambique	Malawi	Zambia
Diesel use per year IEA stats (2005) 1000 000l/y	7 987	381	140	327
Petrol use per year IEA stats (2005) 1000 000l/y	10 289	107	90	210
Ha of sugarcane, Molasses maize cassava to replace total national petrol (2005) consumption	3 230 455 20 938 136 8 935 302 11 483 259	33 595 217 745 63 690 119 420	28 257 183 150 53 571 100 446	65 934 427 350 125 000 234 375
Ha of Jatropha, Palm oil soybeen sunflower canola to replace total national diesel l (2005) consumption	12 138 298 19 051 140 8 925 219 14 450 355	579 027 135 106 908 787 425 755 689 318	212 766 49 645 333 938 156 446 253 293	496 960 115 957 779 983 365 412 591 620
% of total land area needed to meet total transport fuel needs	13	1	3	1
% of arable land needed to fully meet total transport fuel needs	105	4	4	4
% of available arable land needed to meet total transport fuel needs	768	5	48	6
land area needed to meet biofuel targets ha	404 289	30 631	13 464	56 286
Estimates of job creation to meet biofuel targets[3]	296 607[4]	29 571	11 580	51 894
Estimates of job creation to meet total fuel usage[3]	n/a	590 000	222 000	519 000

Where is Africa going with biofuels

- Huge scramble for land for biofuel
- Jatropha is crop of preference in most cases. Some interest in oil palm. Annual oilseeds for South Africa
  - Close to 100 projects but relatively small area
  - Both small grower and large grower models
  - Strategy of hope – nobody has data on likely production
- Sugar and sweet sorghum as bioethanol. Other possibilities such as cassava
  - Mostly as large grower models
  - Huge cost and time delay to get started
- Export aspiration from industry
- Investigation of biofuel for electricity
- Better current use of biofuel (wood and charcoal)
- Huge interest in second generation – especially in SA


Size and ownership of the feedstock production unit
Micro-scale customary farms < 10 ha
Medium-scale private farms 10s to 1 000s ha
Large scale industry farms 1 000s to 10 000s ha
Intended market
Local fuel sustainability at the farm or village
National and international liquid fuel blends
Type A
Community development
Type B
Farm fuel security
Type C
Corporate energy security
Type D
Outgrowers
Type E
Independent producers
Type F
Industry owned

Key concerns

- The economics of production – can small scale farmers earn a living of biofuel
- Labour is possibly key limitation
- At what point does deforestation begin / can biofuels reveres current rates of deforestation
- Are governments going to put in place correct checks and balances to protect social and environmental interests
- Limited impact if for local consumption, but potentially huge impact from uncontrolled export
- Biodiversity very NB for Africa
- Water a big issue in some regions

Some closing thoughts

- Huge potential – but is it the best development option?
- At the macro scale – more than enough land
- At the micro scale - land issues very complex
- Local fuel security will only require a small percentage of land
- Situation and country dempendant
- Can Africa learn from, and avoid, bad practices of other areas?
- Biofuels can potently not compete with food – however labour might be limiting. Is the labour returns from biofuel sufficient to balance reduced household food growing
- Food production can be increased easily – it is the market for food and the ability to afford it that is the problem
- Still working on the carbon and energy balances, but there are potentially positive option – depending on management and economics

Final thought

- Should Africa be degraded to meet the worlds energy needs?

Vs

- Are biofuels the development option that can give broad based economic empowerment to Africa?