



UNIVERSITY OF
KWAZULU-NATAL



Biofuels in Africa – the Land Issue

Dr Helen Watson



Kick-Off Workshop on
“Sustainable, non-food sources of oil”
28 & 29 January 2010, Johannesburg



**Competence Platform on
Energy Crop & Agroforestry Systems
for Arid and Semi-arid Ecosystems – Africa**

www.compete-bioafrica.net



Duration: January 2007 to December 2009

Coordination: Dr. Rainer Janssen, WIP – Renewable Energies, Germany

(E-mail: rainer.janssen@wip-munich.de)

& by Dr. Jeremy Woods and Dr Rocio Diaz Chavez, Imperial College London, UK

The COMPETE Consortium consisted of 44 partners from 5 continents:-

Africa: Botswana, Burkina Faso, Kenya, Mali, Senegal, South Africa, Tanzania, & Zambia

Europe: from Austria, Belgium, Germany, Italy, Norway, The Netherlands, Sweden, & UK

Asia: from China, India, & Thailand

Latin America: from Brazil & Mexico

International: the AFDB, CI, & FAO

COMPETE aimed to

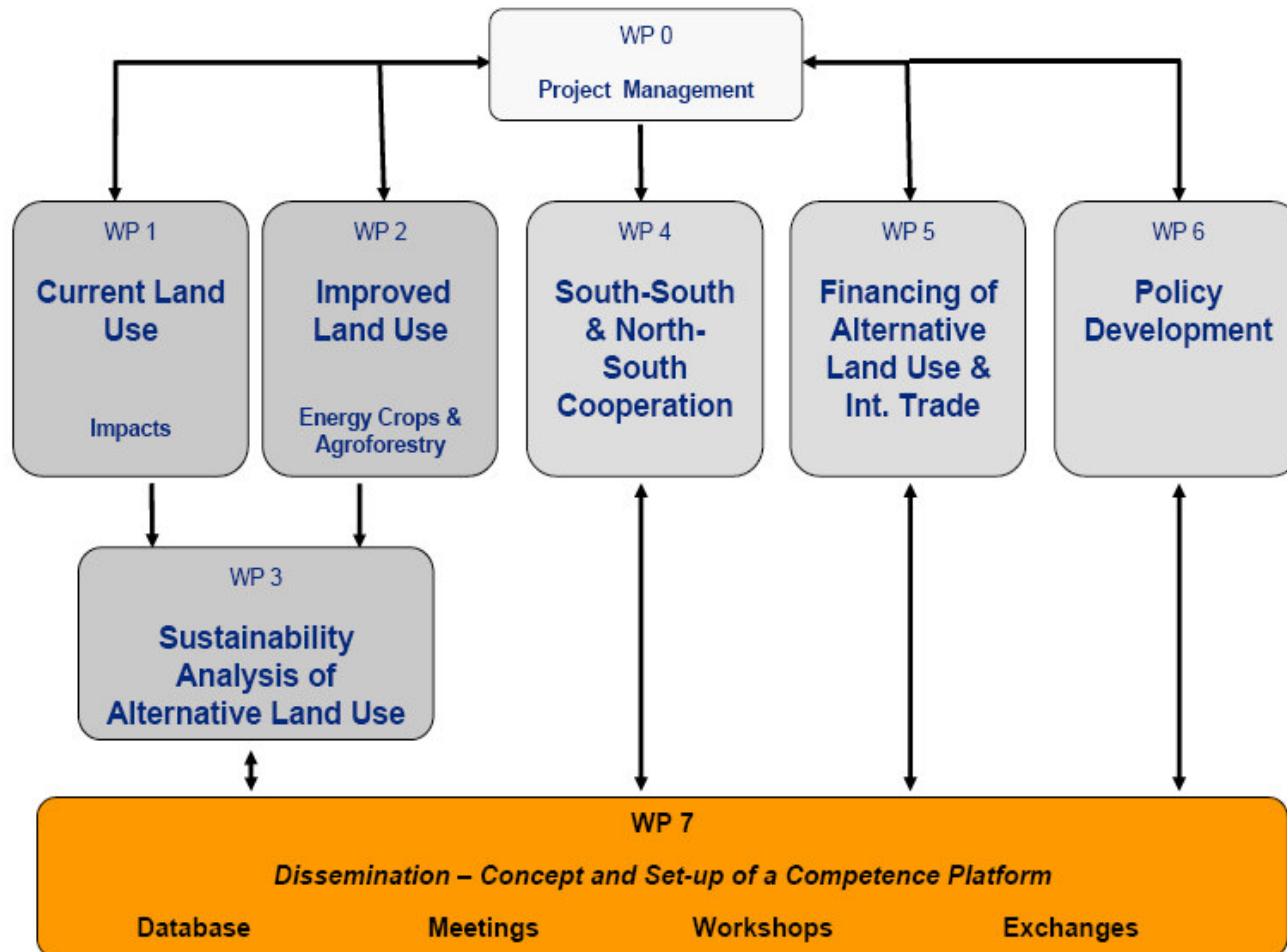
- establish a platform for policy dialogue & capacity building
- identify pathways for the sustainable provision of bioenergy

in order to

- improve the quality of life and create alternative means of income for Africa's rural population
- aid the preservation of intact eco-systems in Africa's arid and semi-arid regions
- enhance the equitable exchange of knowledge between EU & developing countries



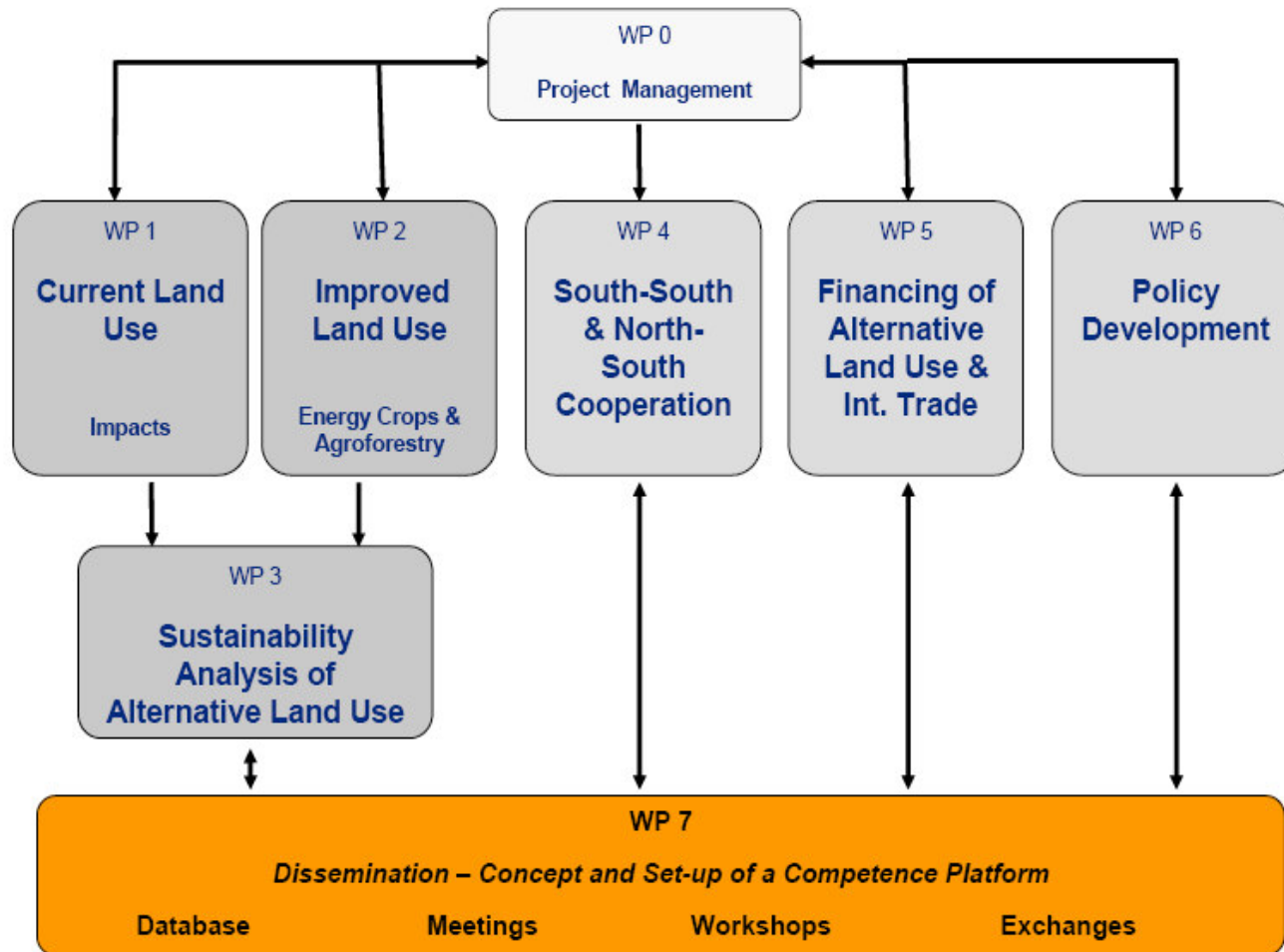
Project Overview



WP1: Identify land available and suitable for bioenergy feedstock production

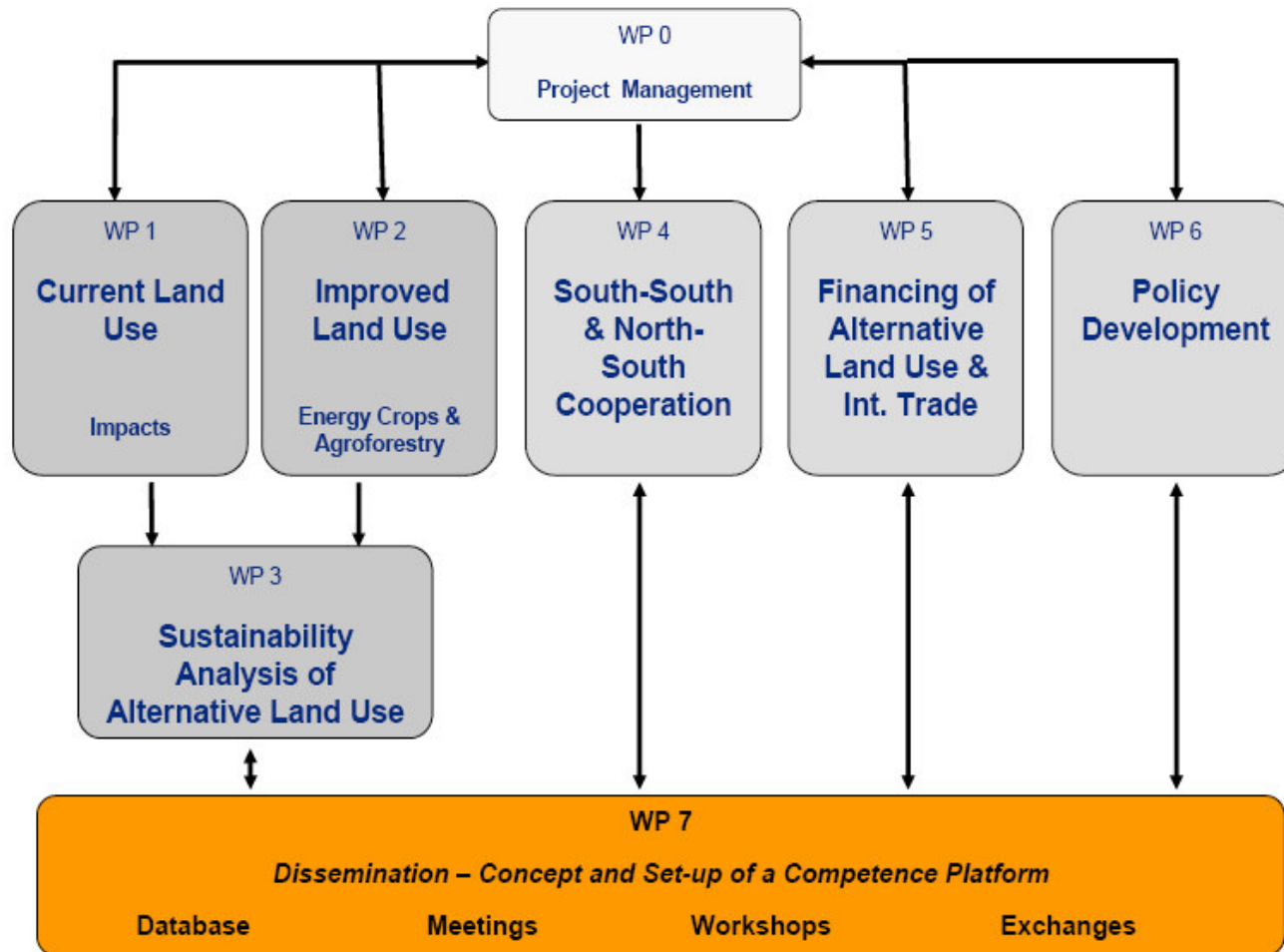
Output: Reports on findings, and Interactive GIS on website showing stages of filtering out unavailable and unsuitable land, and supply of shape files to govts., researchers, investors, etc

Project Overview



WP2: Synthesize experiences with different existing biomass production systems
Output: Identified promising new (or improved) biomass production and utilisation schemes

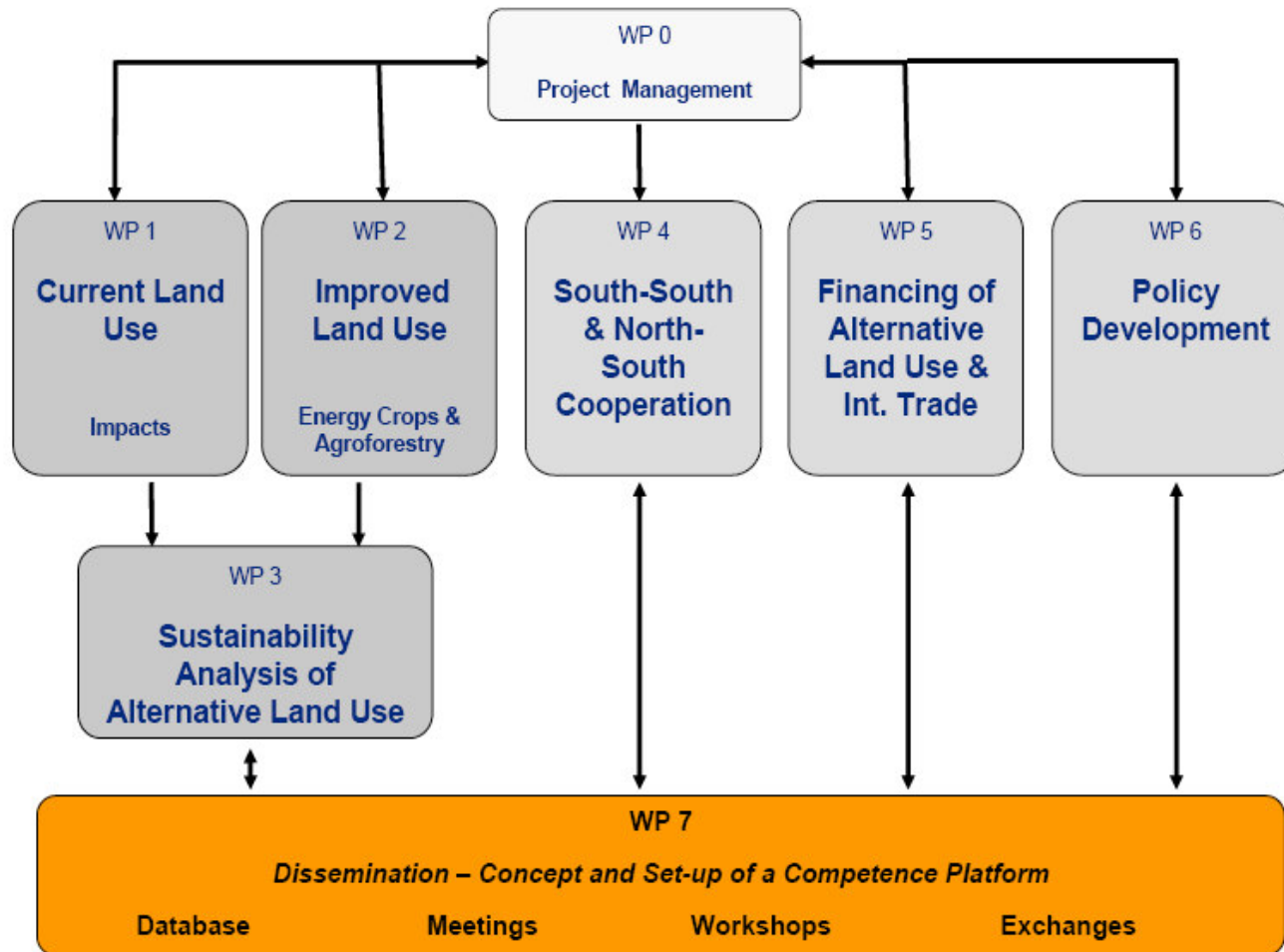
Project Overview



WP3: Ensure the ecological, economic and social sustainability of the implementation of alternative energy crop and agroforestry schemes.

Output: COMPETE Declaration on Sustainable Bioenergy for Africa, and a “Good Practice Assessment System for Bioenergy Projects in Africa”

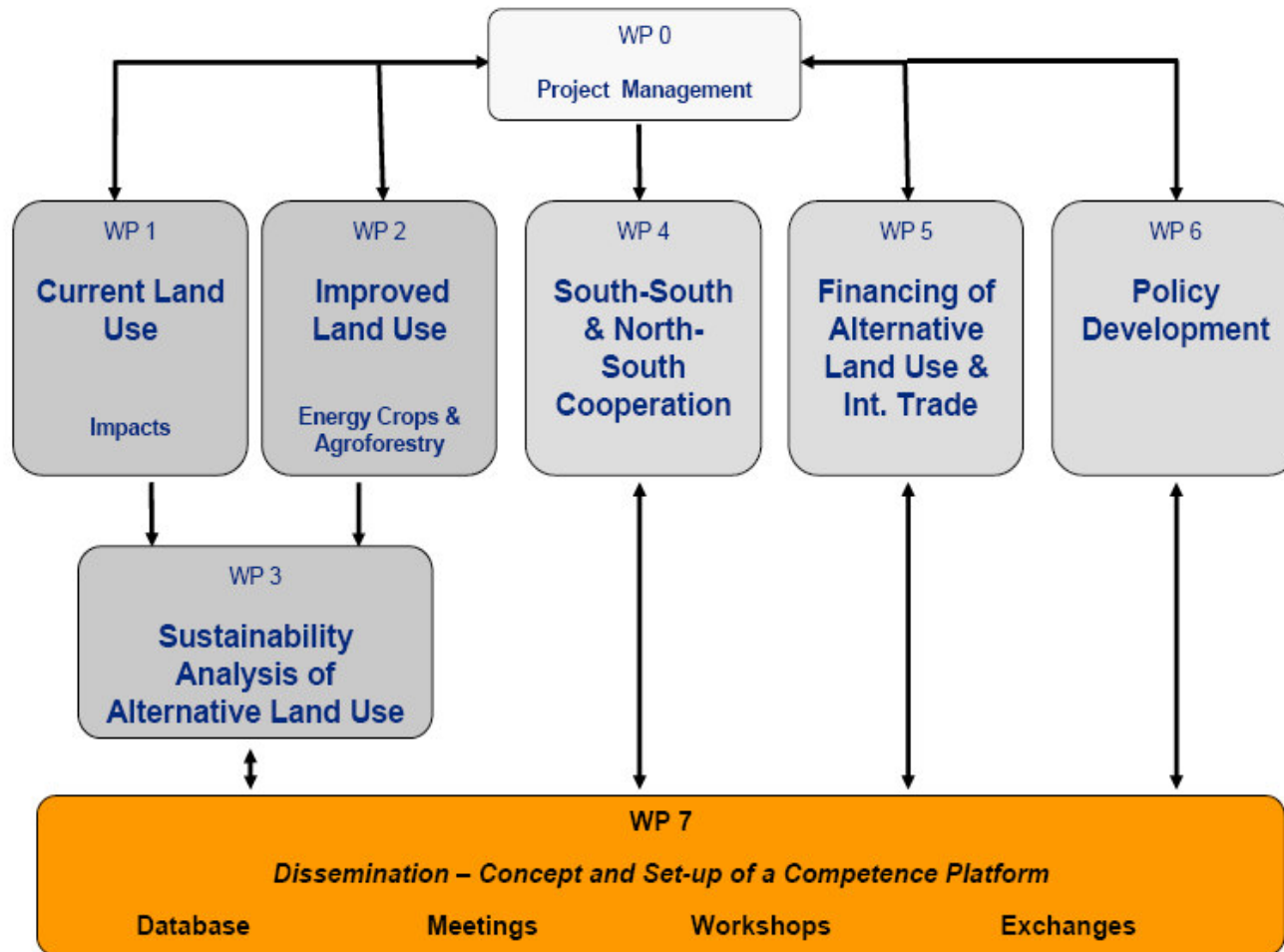
Project Overview



WP4: Link the project activities in Africa with on-going successful research and demonstration efforts in the field of energy crops and agroforestry systems.

Output: Transfer of knowledge and technical know-how between developed and developing countries. Study visits to India (ethanol from sweet sorghum, biodiesel from jatropha), Brazil (ethanol from sugar cane), & Mexico (jatropha)

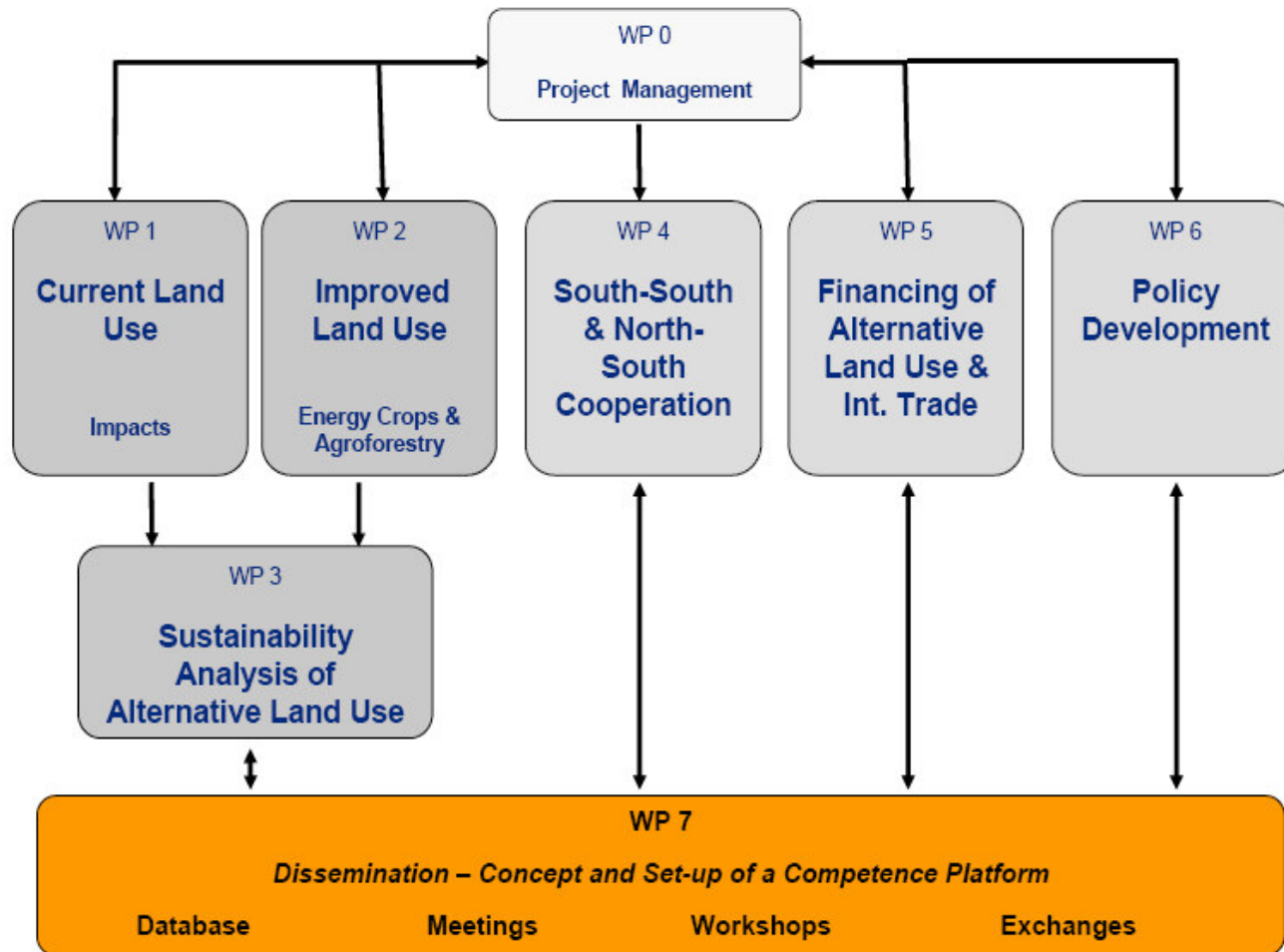
Project Overview



WP5: Identify existing financing mechanisms and barriers

Output: Identified opportunities for financing energy crop and agroforestry activities in arid and semi-arid Africa, and for linking bio-energy production in Africa to international (export) markets

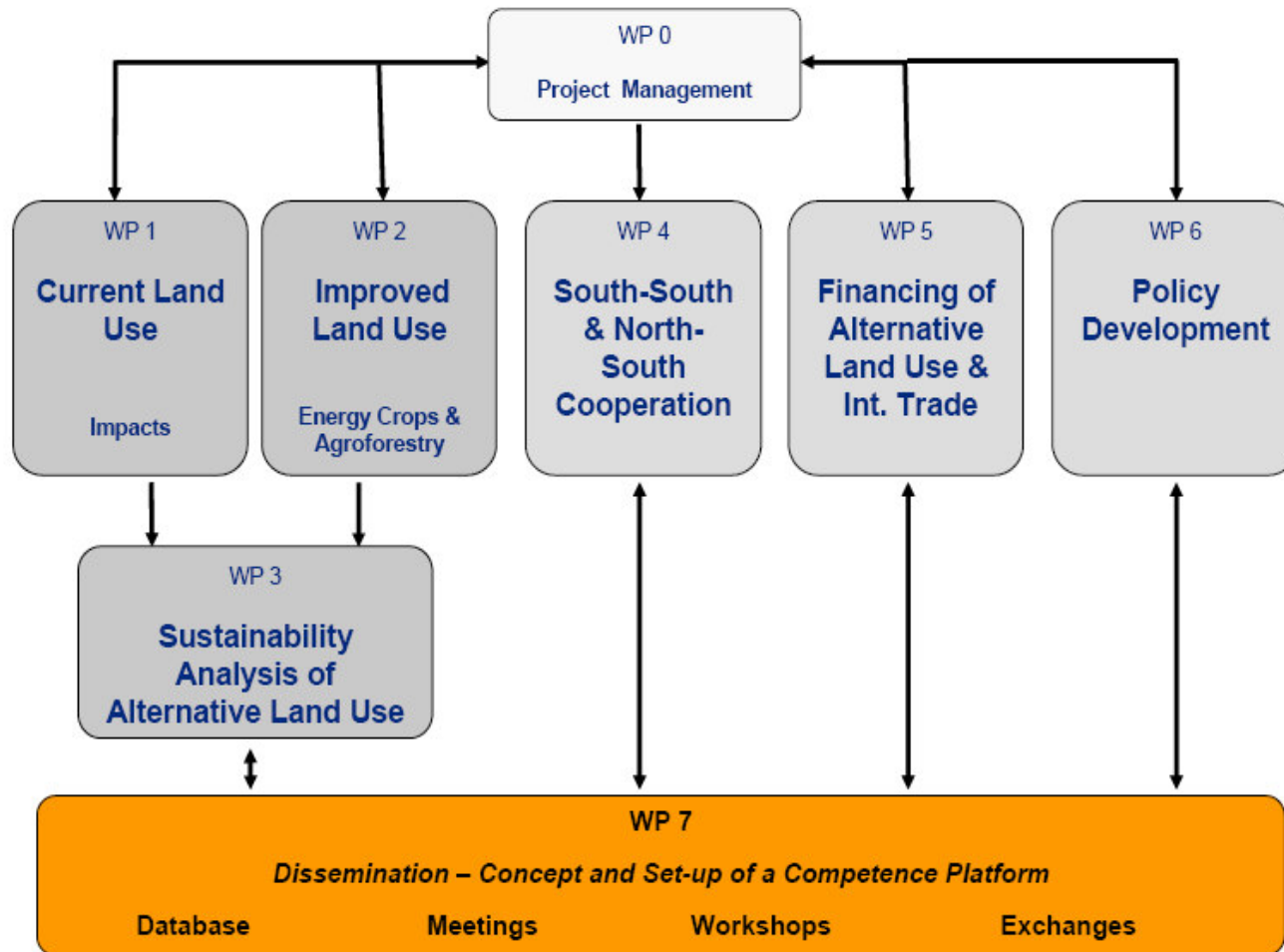
Project Overview



WP6: Identify and evaluate bioenergy related policies and strategies in African countries

Output: Policy guidelines on (a) avoiding the potential conflict between food & bioenergy production, (b) value creation of bioenergy development, and (c) financing & implementing bioenergy projects in Africa.

Project Overview



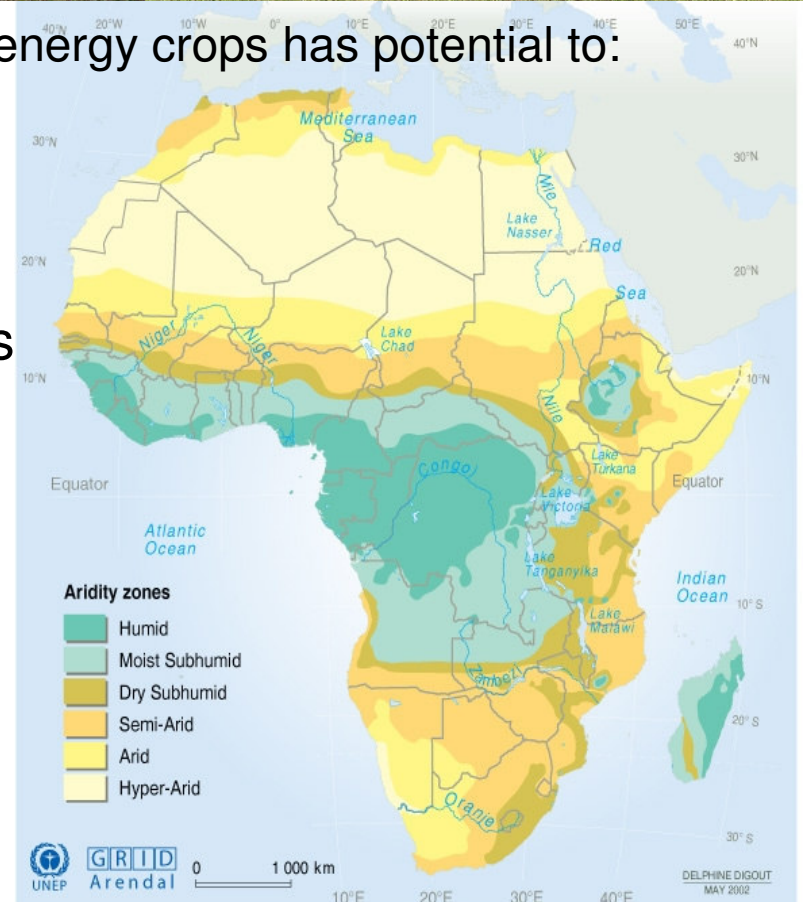
WP7: *Workshops* in Mauritius, India, Tanzania, Zambia, Burkina Faso, Mali, Senegal, Hamburg, and Brussels.

Exchange students from SA & Senegal to IC, & IC to Senegal
Database ongoing on website www.compete-bioafrica.net

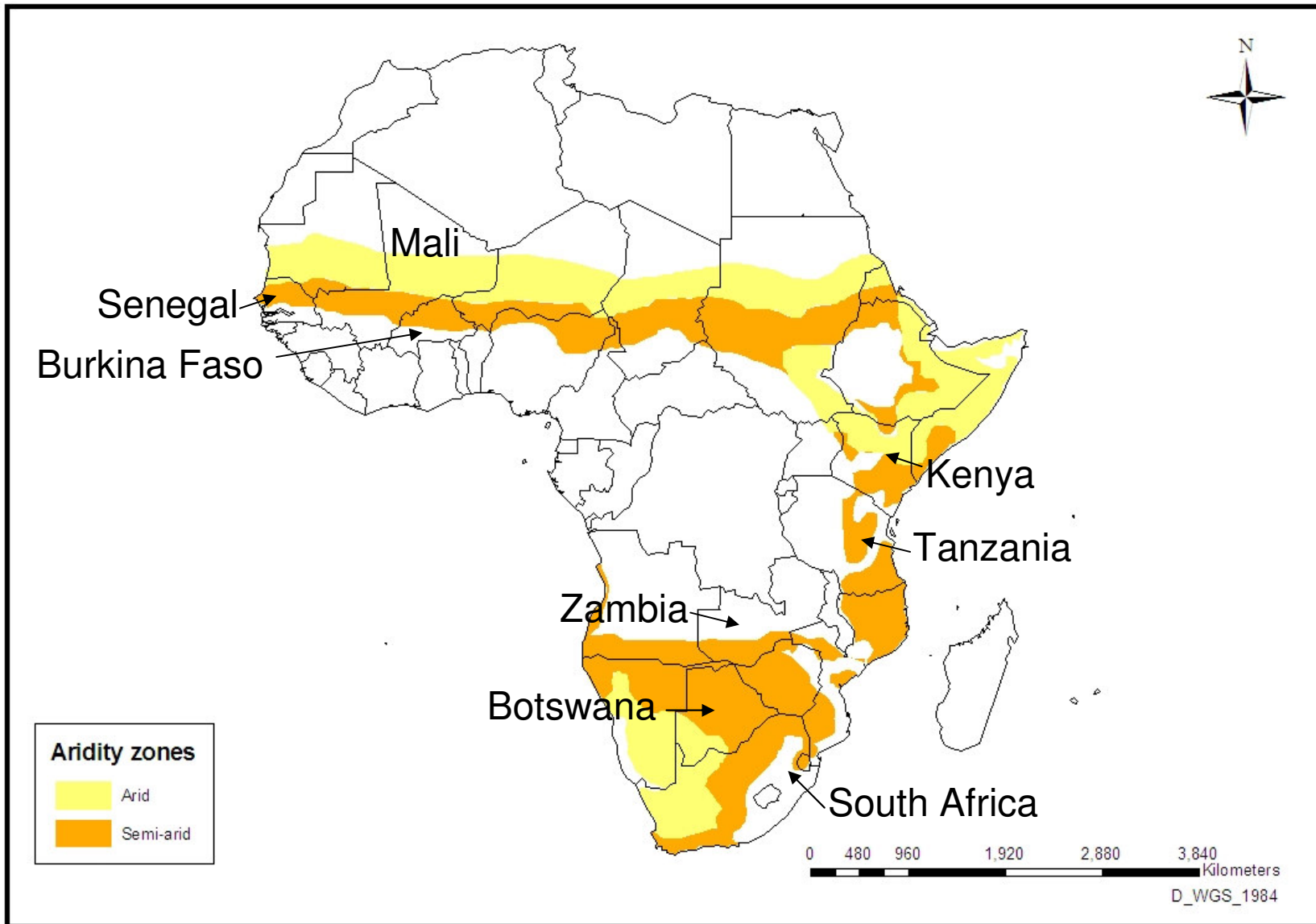


Putting land under bioenergy crops has potential to:

- Displace rural poor
- Deny poor access to natural resources
- Destroy biodiversity
- Displace food & cash crops
- Deplete/pollute water resources



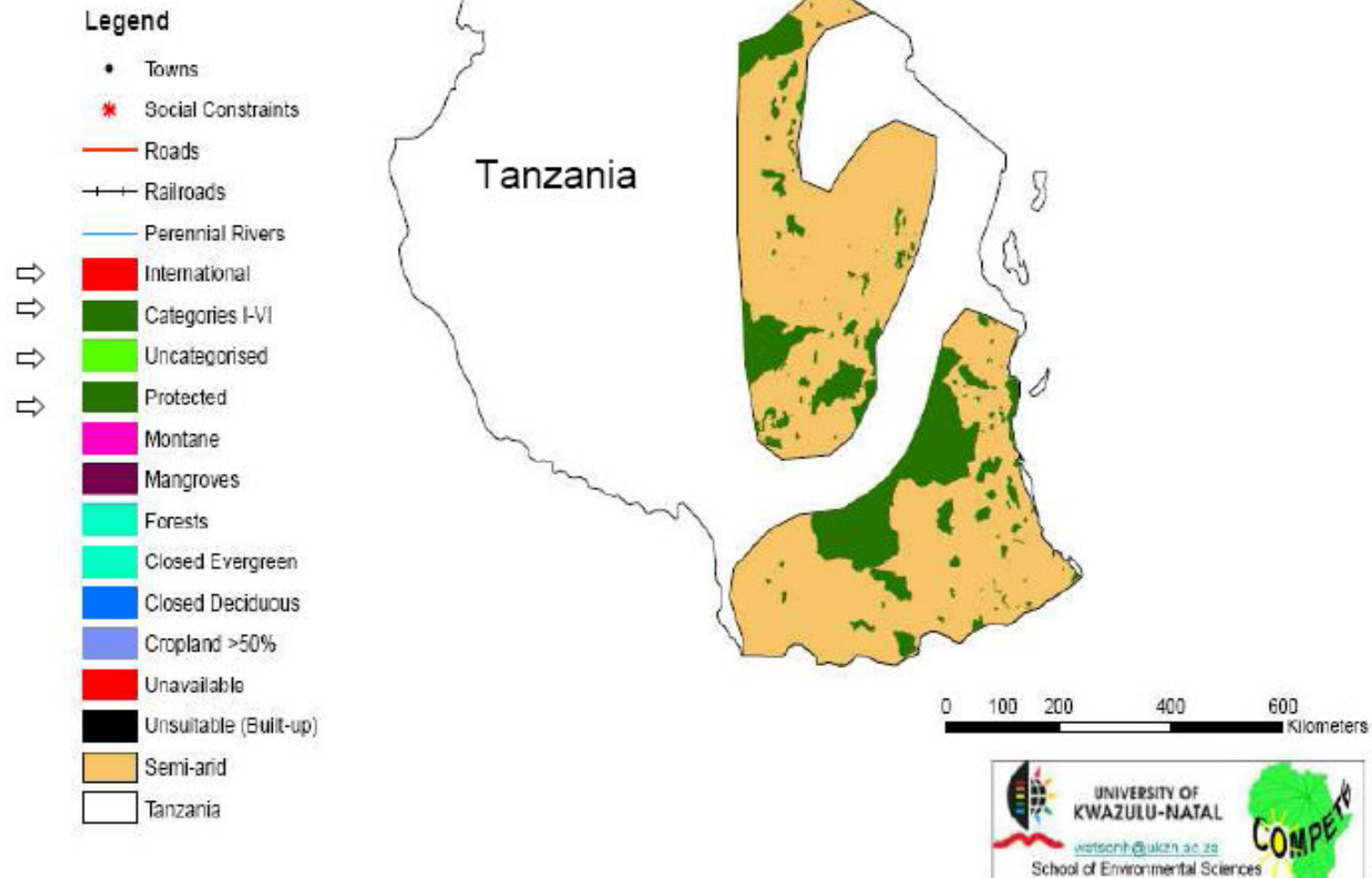
Source: World Meteorological Organization (WMO), United Nations Environment Programme (UNEP), *Climate Change 2001: Impacts, Adaptation, and Vulnerability*, Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).



Where will bioenergy land use create value and be sustainable ?
COMPETE focus: arid & semi-arid zones
8 study countries

Use of Geographic Information Systems (GIS) & 1km² global databases

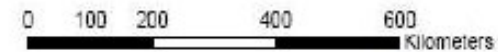
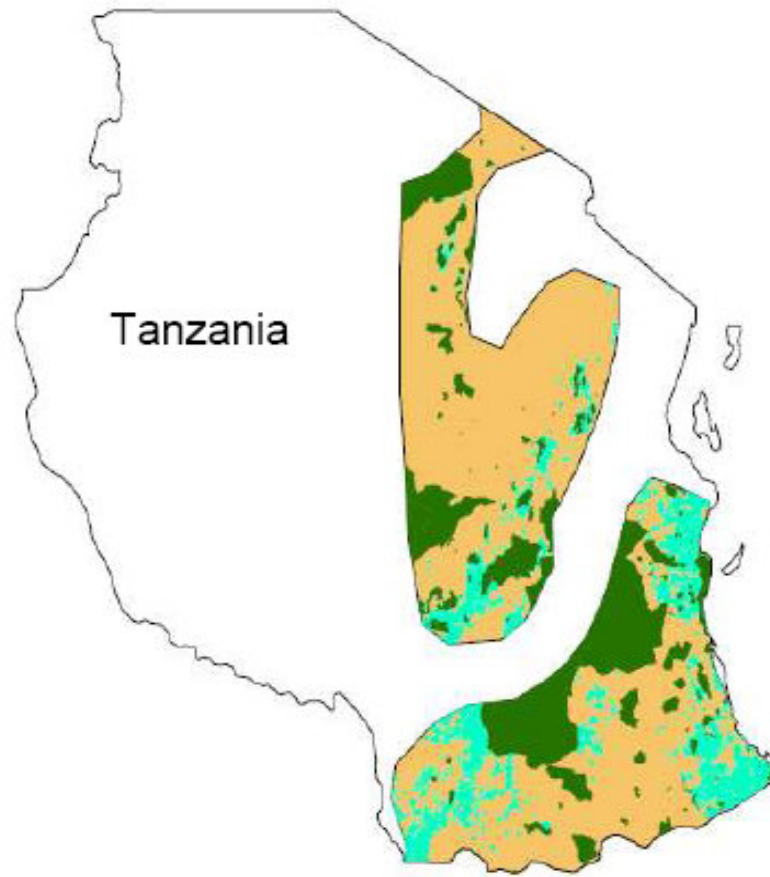
Filter out Protected Areas (unavailable).



Filter out Forests, Wetlands (unavailable): Safeguard Biodiversity



- Legend**
- Towns
 - * Social Constraints
 - Roads
 - +— Railroads
 - Perennial Rivers
 - International
 - Categories I-VI
 - Uncategorised
 - Protected
 - ↳ Montane
 - ↳ Mangroves
 - ↳ Forests
 - ↳ Closed Evergreen
 - ↳ Closed Deciduous
 - Cropland >50%
 - Unavailable
 - Unsuitable (Built-up)
 - Semi-arid
 - Tanzania

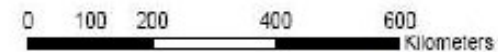
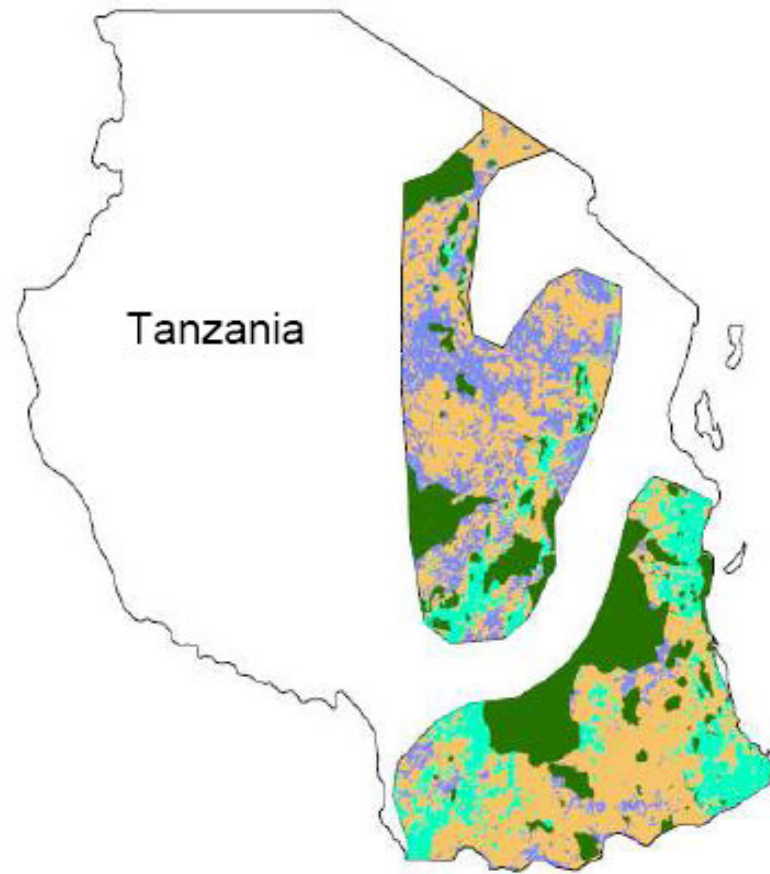


Filter out food & cash crops (unavailable): Safeguard Food Security



Legend

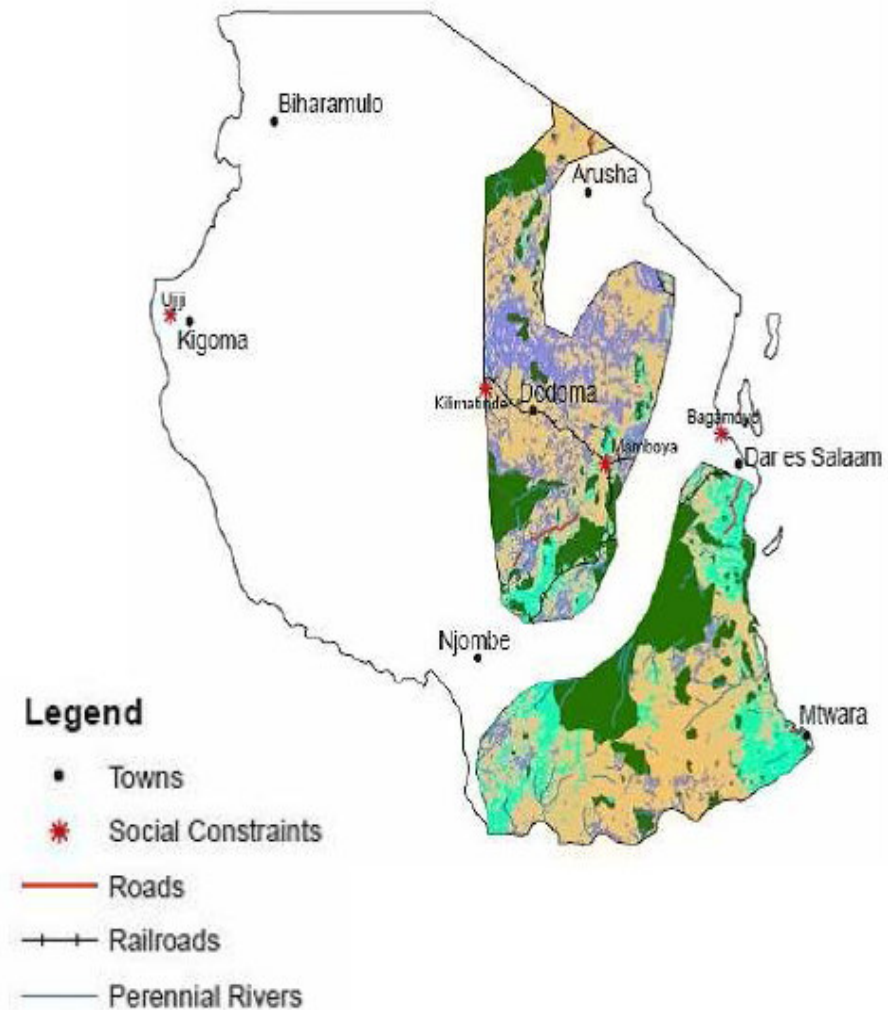
- Towns
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- Mangroves
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- Closed Evergreen
- Closed Deciduous
- Cropland >50%
- Unavailable
- Unsuitable (Built-up)
- Semi-arid
- Tanzania



Filter out Unsuitable areas

- Background
- Bare rock
- Cities
- Closed deciduous forest
- Closed evergreen lowland forest
- Closed grassland
- Croplands (>50%)
- Croplands with open woody vegetation
- Deciduous shrubland with sparse trees
- Deciduous woodland
- Degraded evergreen lowland forest
- Irrigated croplands
- Mangrove
- Montane forest (>1500 m)
- Mosaic Forest / Croplands
- Mosaic Forest / Savanna
- Open deciduous shrubland
- Open grassland
- Open grassland with sparse shrubs
- Salt hardpans
- Sandy desert and dunes
- Sparse grassland
- Stony desert
- Submontane forest (900 -1500 m)
- Swamp bushland and grassland
- Swamp forest
- Tree crops
- Waterbodies

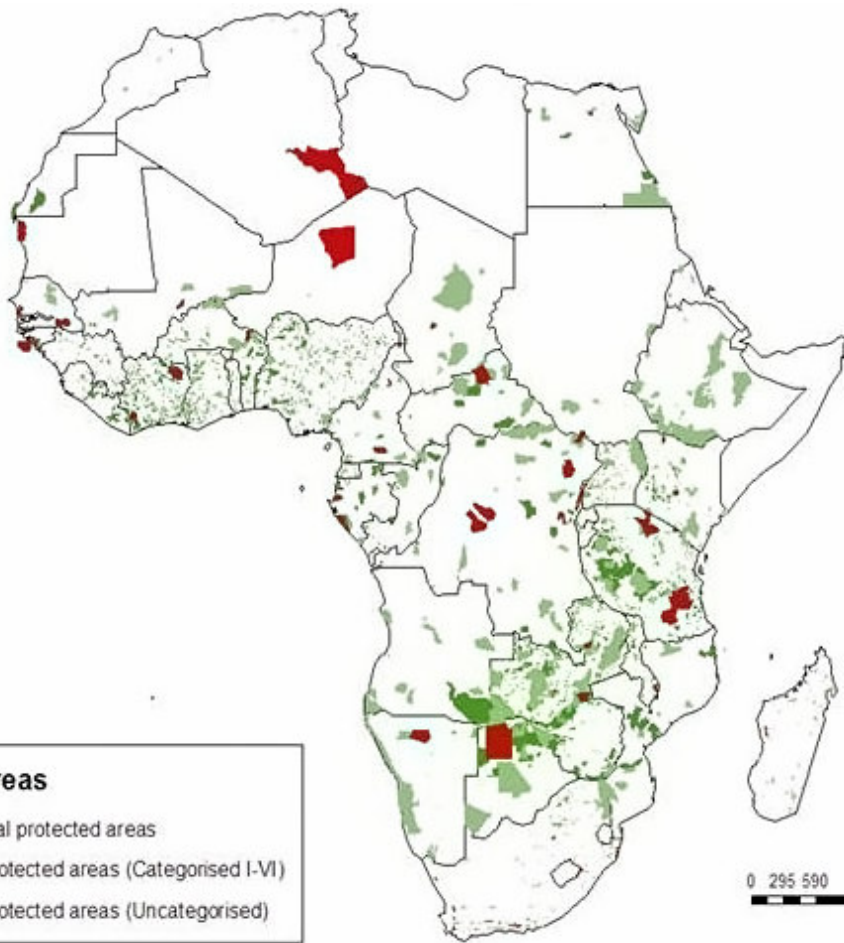
Proximity of available and suitable to towns, transport infrastructure, water supplies, etc



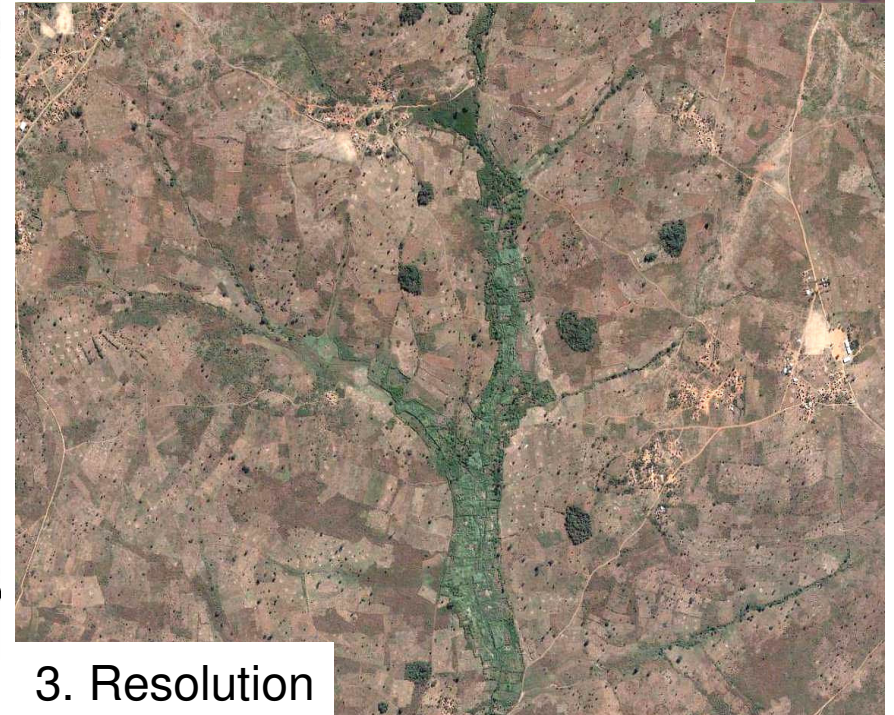
Substantial areas potentially available & suitable for bioenergy

Country	Arid km ²	Semi-arid km ²	Arid %	Semi-arid %	Arid & Semi- arid km ²	Arid & Semi- arid %
Burkina Faso	0	22 756	0	15	22 756	15
Senegal	10 200	5 583	72	6	15 783	14
Mali	121 397	71 041	31	29	192 438	30
Kenya	209 760	169 938	91	75	379 698	82
Tanzania	n/a	147 252	n/a	46	147 252	46
Zambia	n/a	67 383	n/a	42	67 383	42
Botswana	102 193	189 667	80	42	291 860	51
South Africa	353 937	368 944	94	70	722 874	79

- Filtering out unavailable & unsuitable land using GIS & global 1km² databases quick, cheap & effective for identifying **where** land is potentially available & suitable
- Recognize accuracy effected by 1, 2 & 3



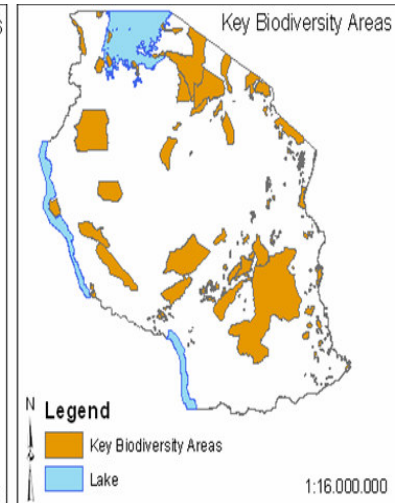
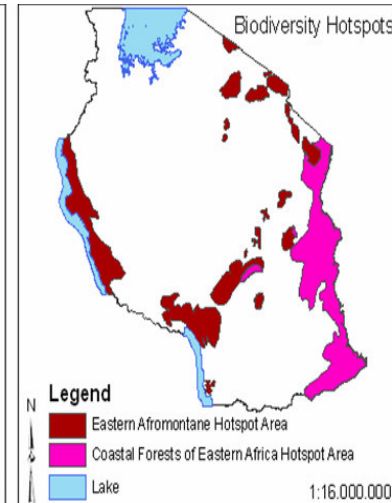
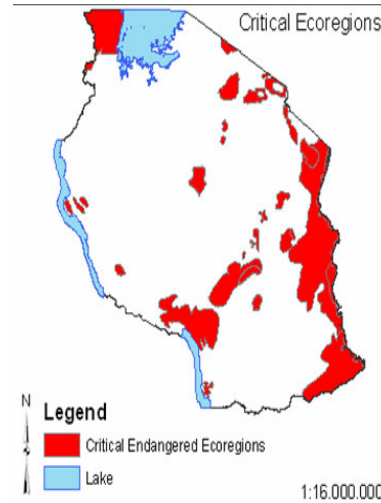
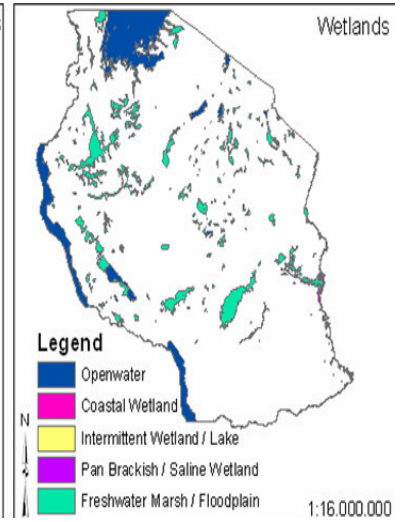
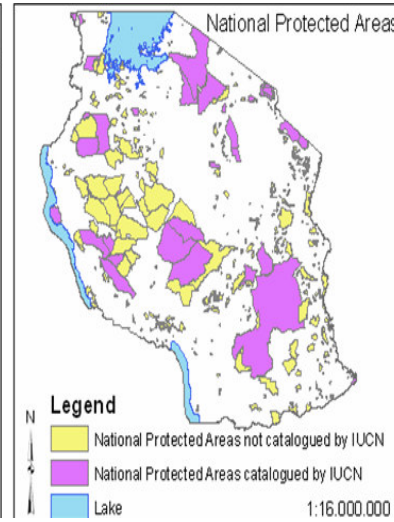
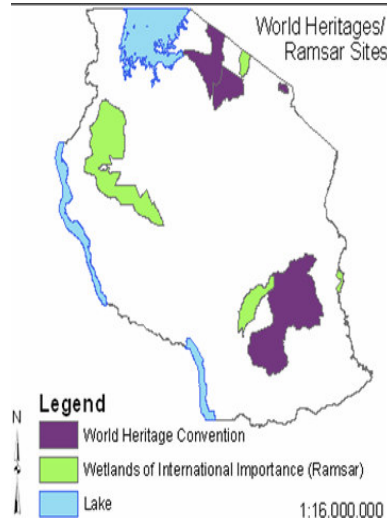
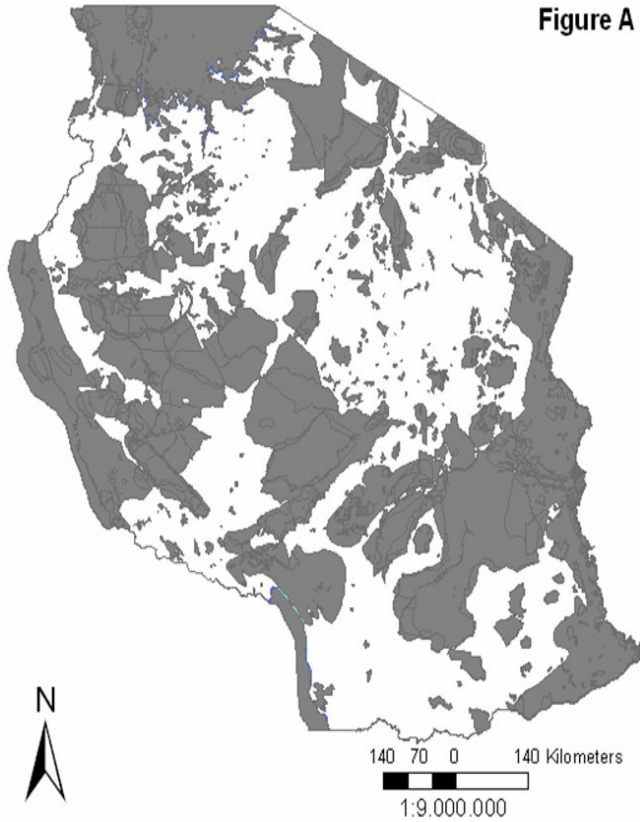
2. Temporally dynamic savannas

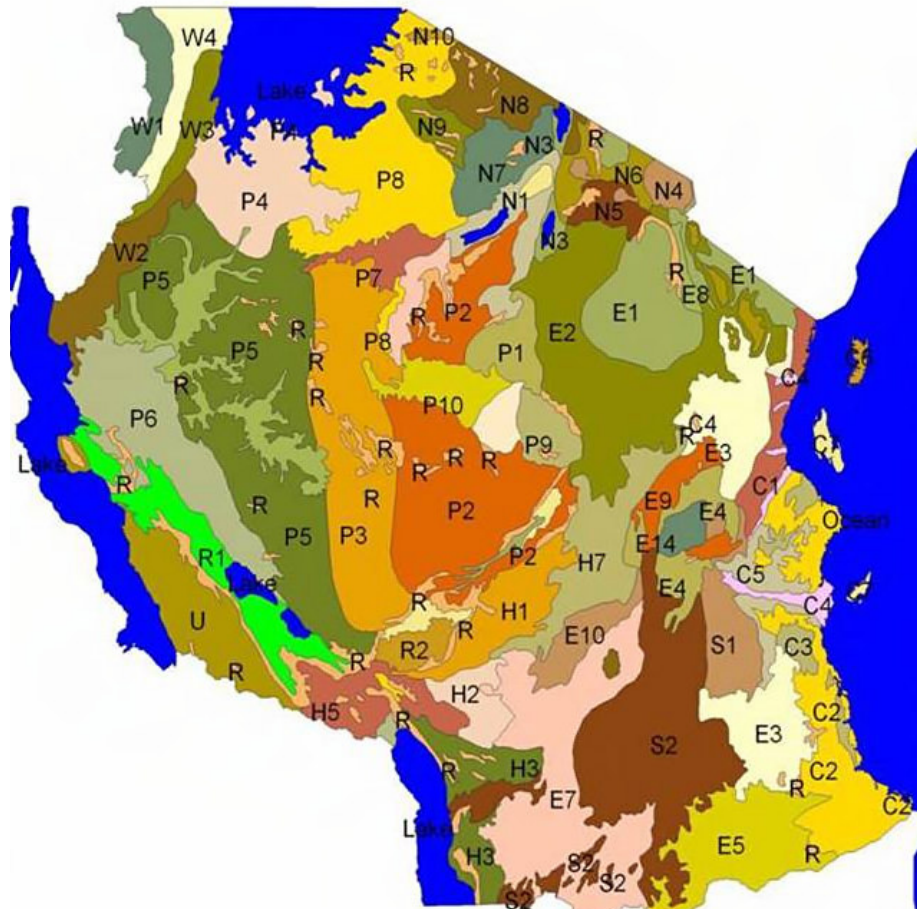


3. Resolution

1. Unfenced PA not representative

Figure A





N6- too short growing period for crops, strictly managed livestock grazing of natural grasses

P2- sorghum, sisal, jatropha

E3- maize, sorghum, rice, cassava, sweet potatoes, sugar cane, peas, citrus, mangoes, pine apple, cashew, ground nuts, soya bean, sunflower, tobacco, cotton, sisal, jatropha. grasses & legumes for animals



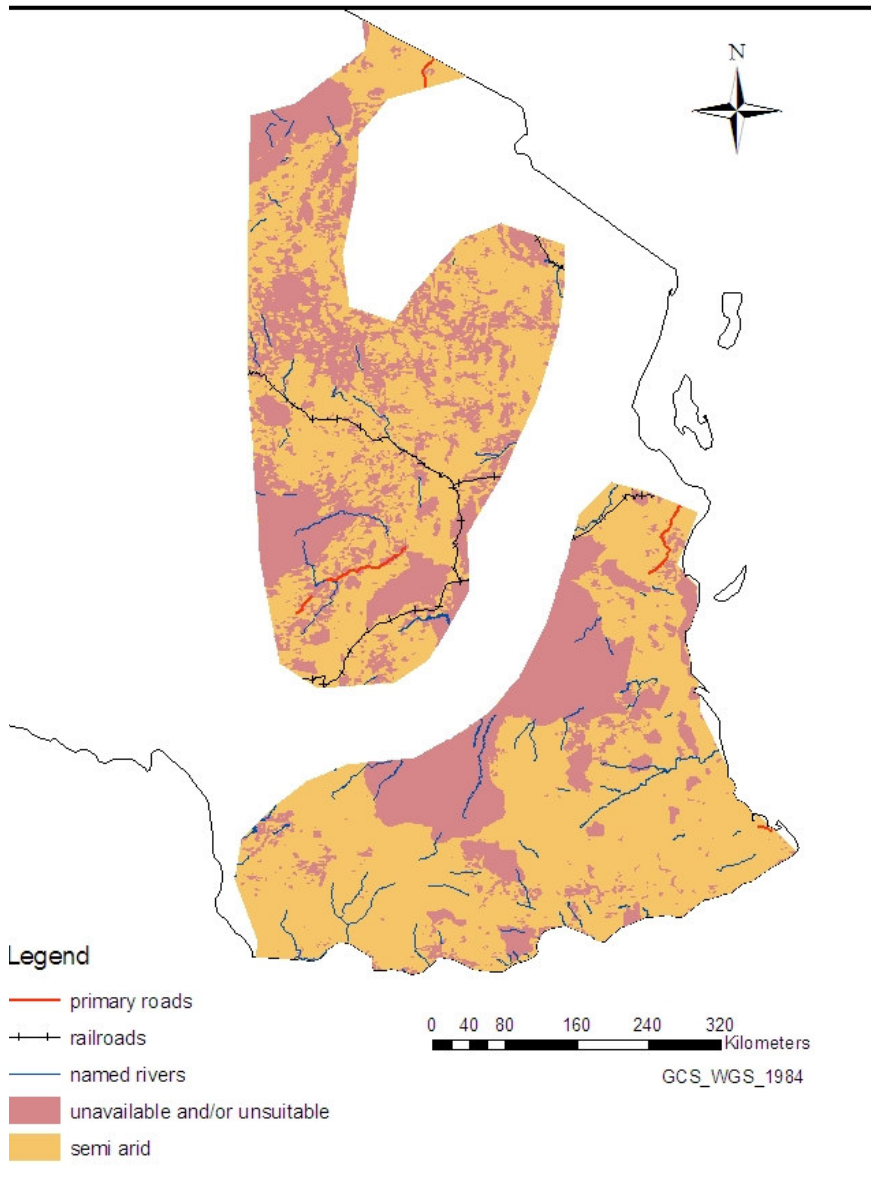
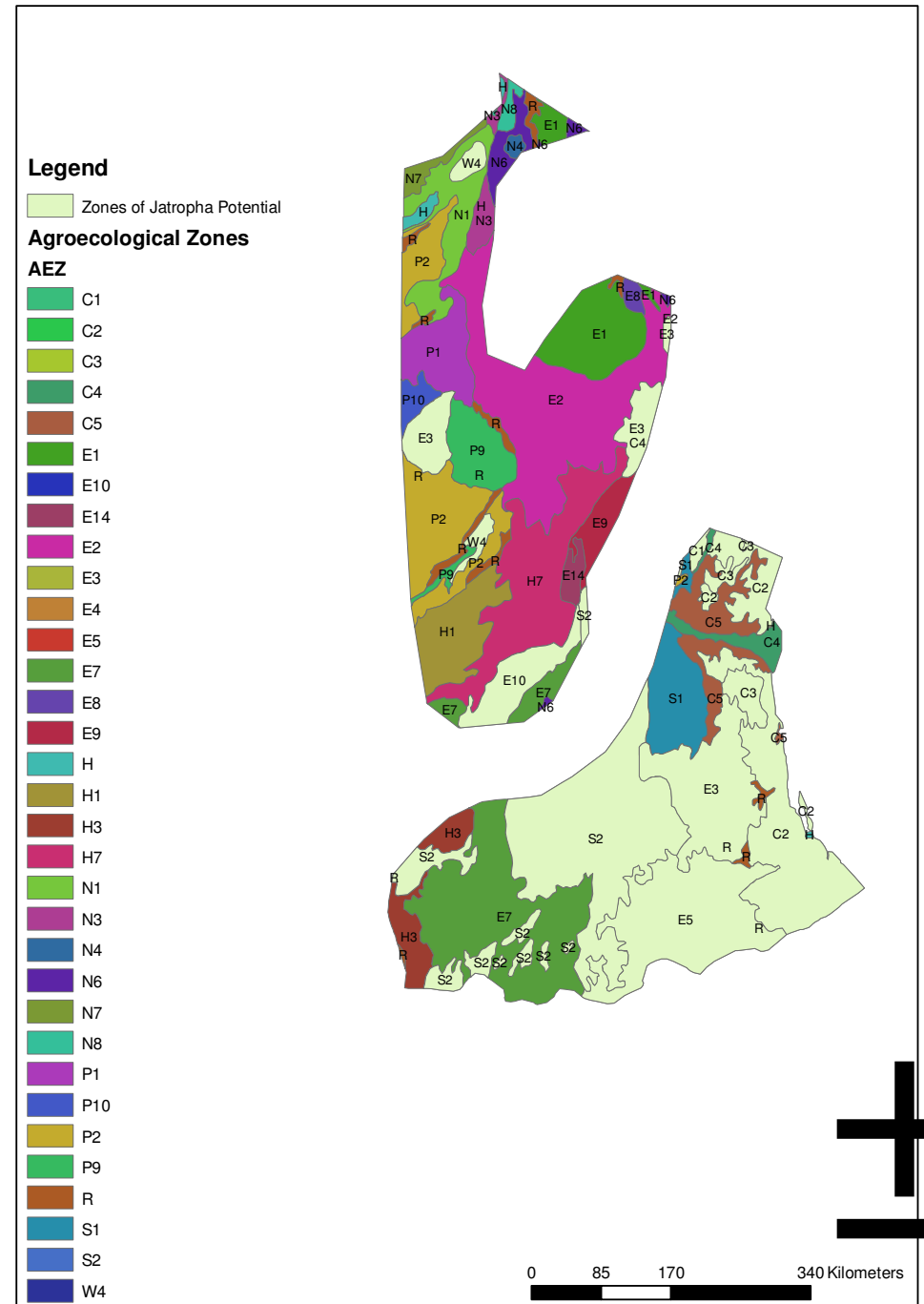
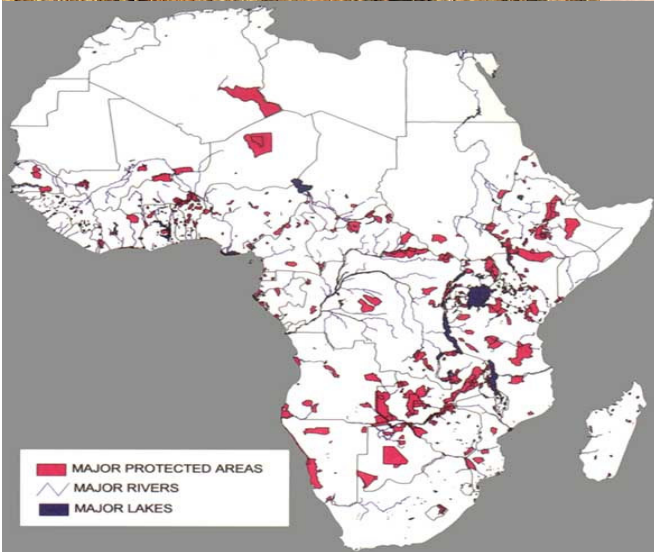


Figure T5: Areas unavailable and/or unsuitable for bioenergy crops relative to primary roads, railroads and named rivers in Tanzania's semi arid regions.





Need to exclude areas used by:
Hunter gatherers &
Pastoralists





Government schemes, or subsidized or tax incentives

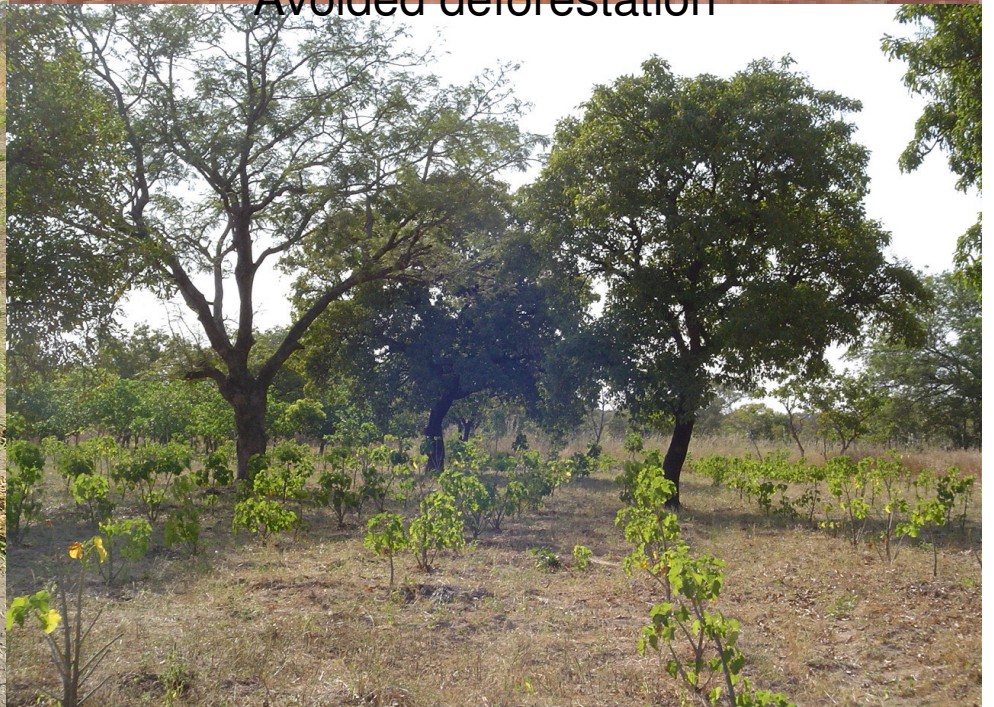




Amount of land needed & detrimental effects of conversion to bioenergy can be reduced by good cultivation practices & making better use of the crop



Avoided deforestation

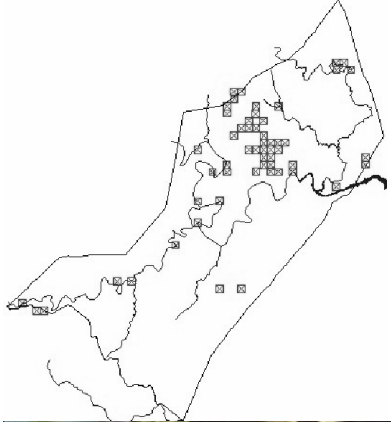






need to:

- Exploit bioenergy potential of invasive alien plants.
- Be cautious re: introducing non-African bioenergy crops.
- Research bioenergy potential of indigenous plants.



Ximenia caffra



Pappea capensis

Garalo village, Mali







IF WE DO IT RIGHT – THE FUTURE IS
BRIGHT



Thank you for your attention