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Promoting Food Security in Africa through Integrated Bio-energy Systems

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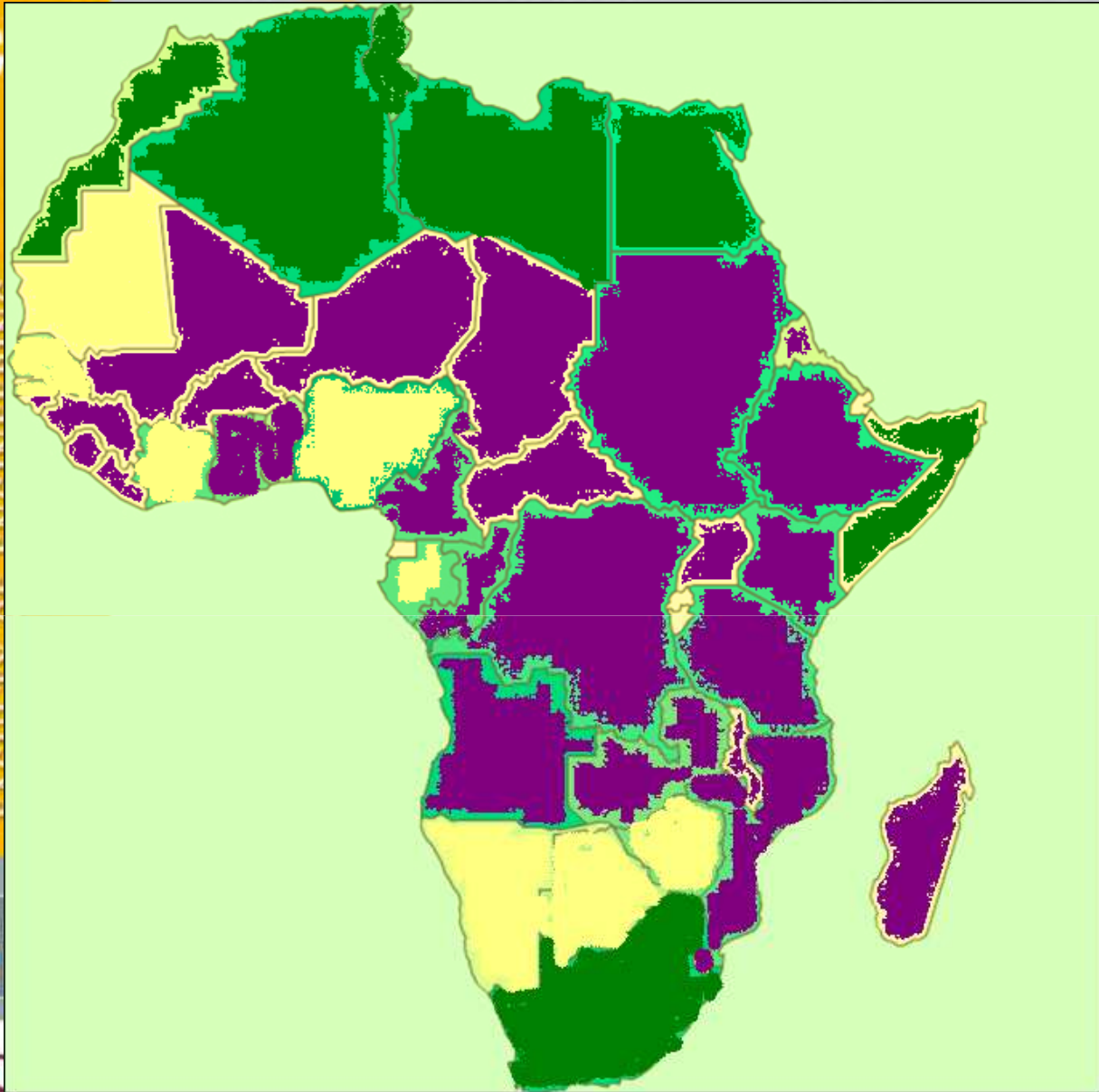


Key Points



- Bio-energy in rural Africa for socio-economic development, rather than GHG emissions and fossil fuel replacement
 - Should address rising local food&energy demands
- Integration of bio-energy into food production systems can be improved significantly
 - Co-production of bio-energy feedstocks with food crops, and/or use of residues from agriculture
 - Bio-energy can increase access to energy in food processing, to improve efficiency and limit losses



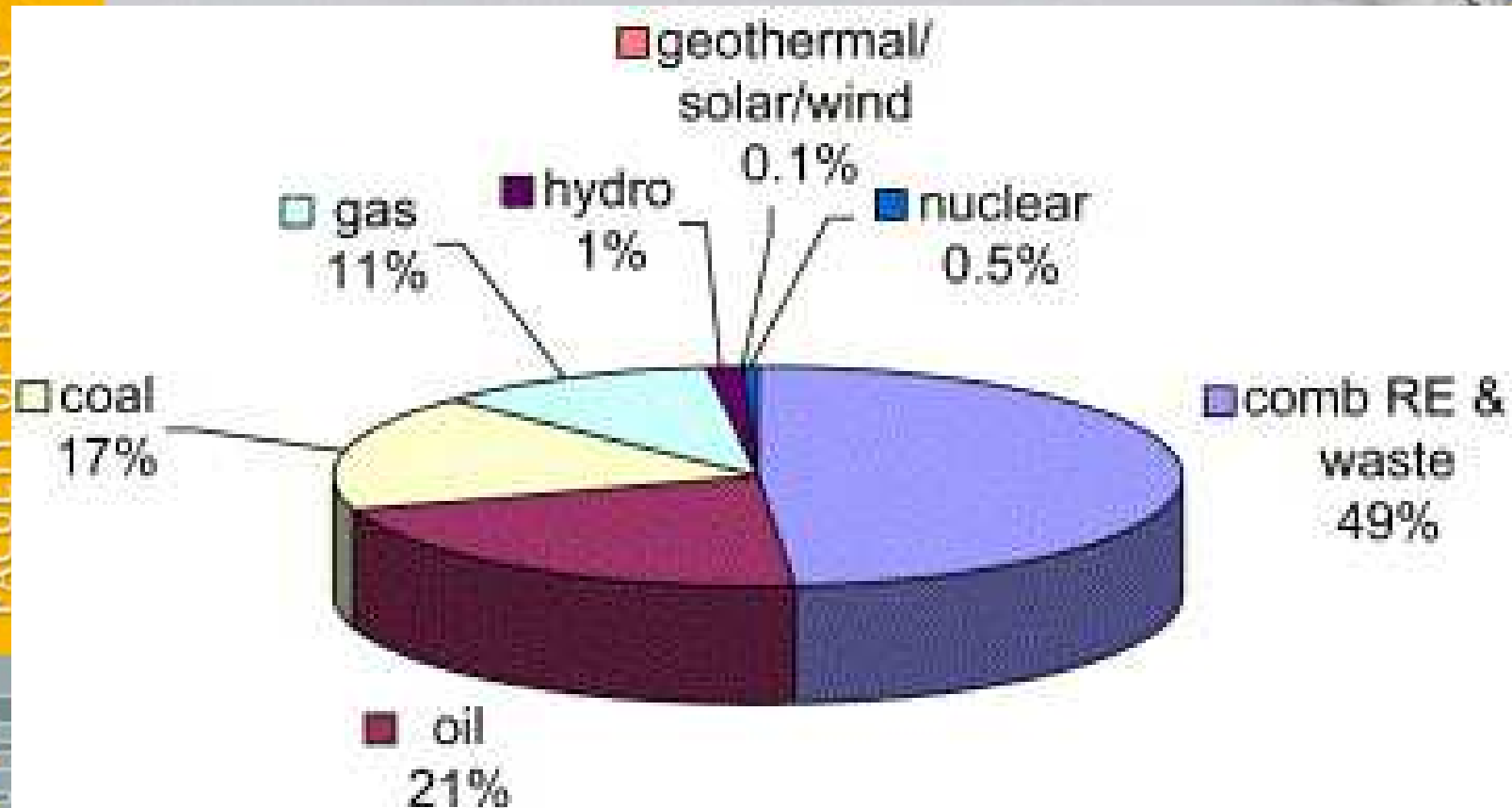


| |
|---------|
| 76-100% |
| 51-75% |
| 26-50% |
| 0-25% |

- **Energy poverty in households**

Source: Redrawn from WHO 2006: Fuel for life. Household energy and Health

Bioenergy Production in Africa





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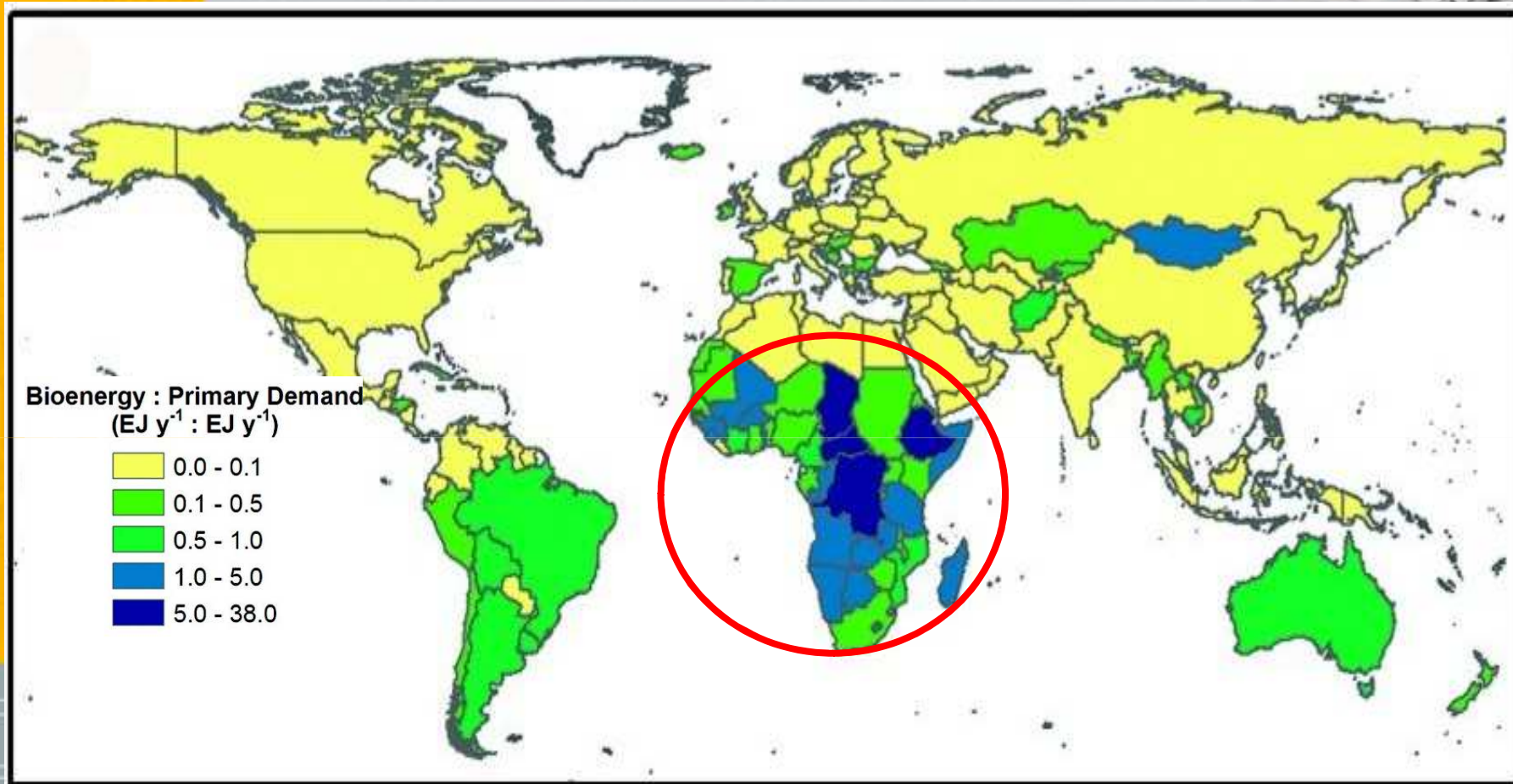
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Charcoal Production



Deforestation is a concern

Agricultural Residues in Africa

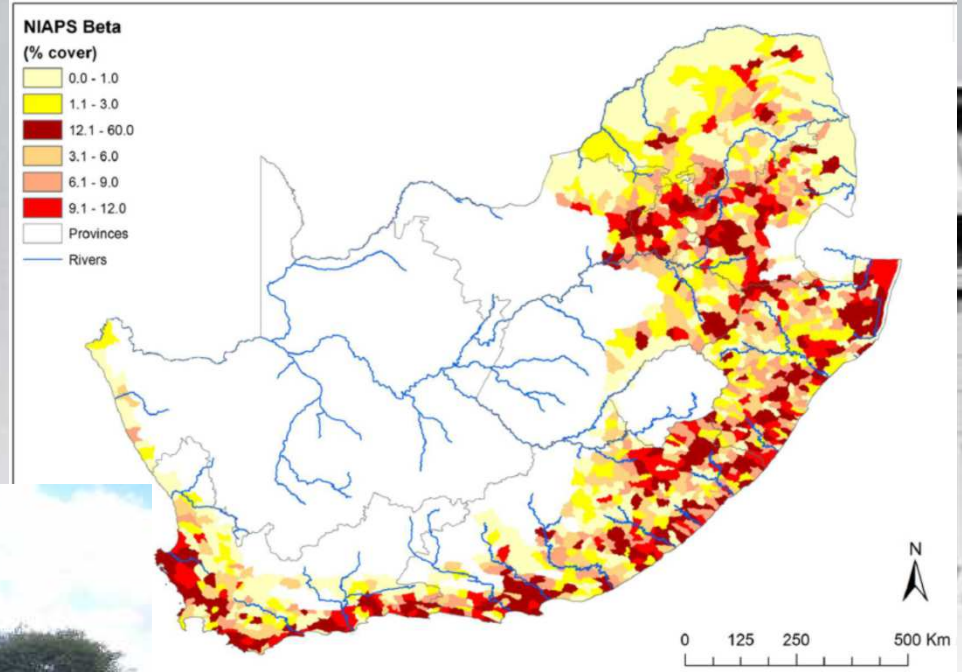


Ratio of the energy content of the biomass on abandoned agriculture lands relative to the current primary energy demand at the country level. The energy content of biomass is assumed to be 20 kJ g⁻¹.
Source: Campbell et al. (2008)



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Bush Encroachment on Farmland: Production, water

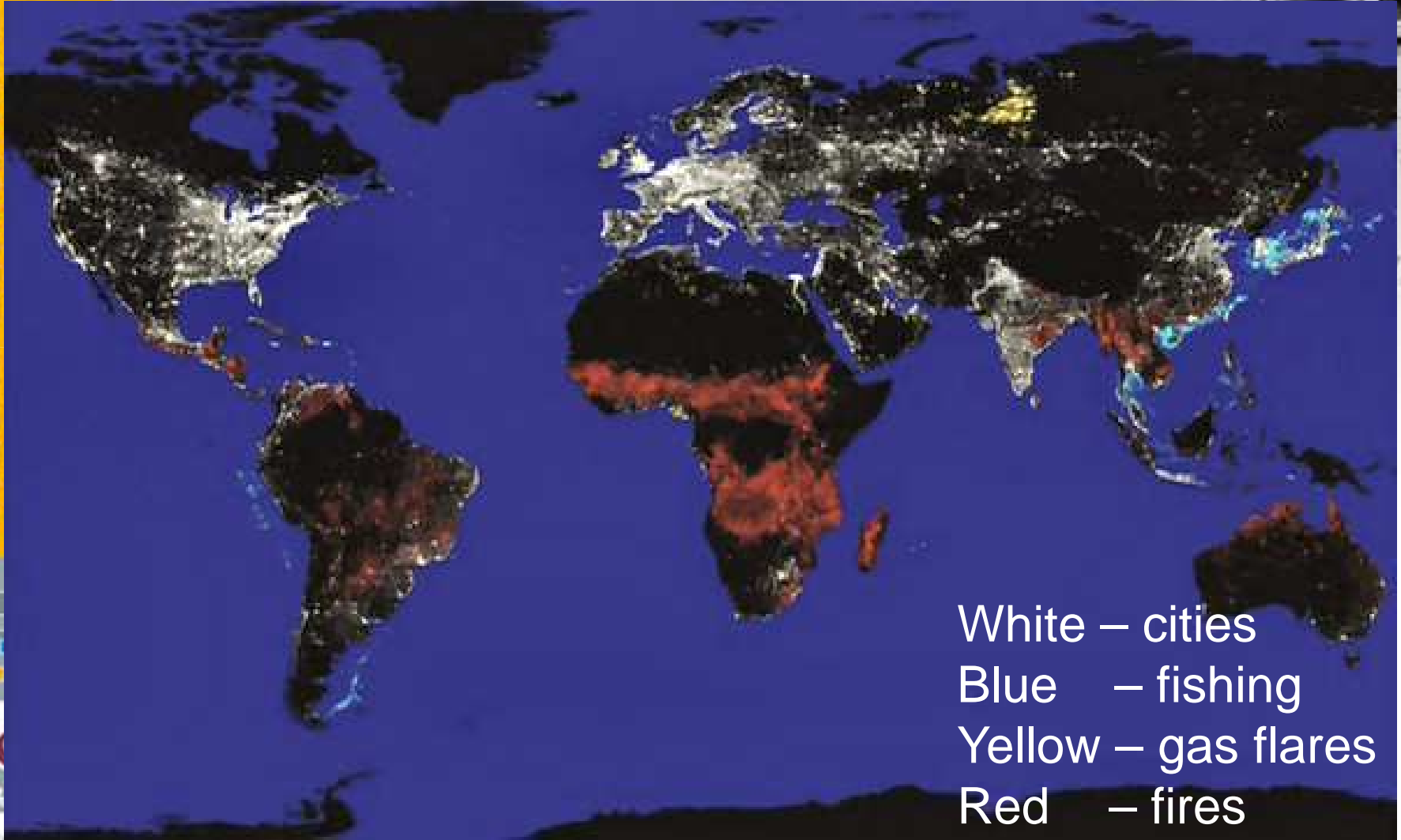


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Present Day Bio-energy Production

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White – cities
Blue – fishing
Yellow – gas flares
Red – fires

Best practices for biomass production

Agroforestry



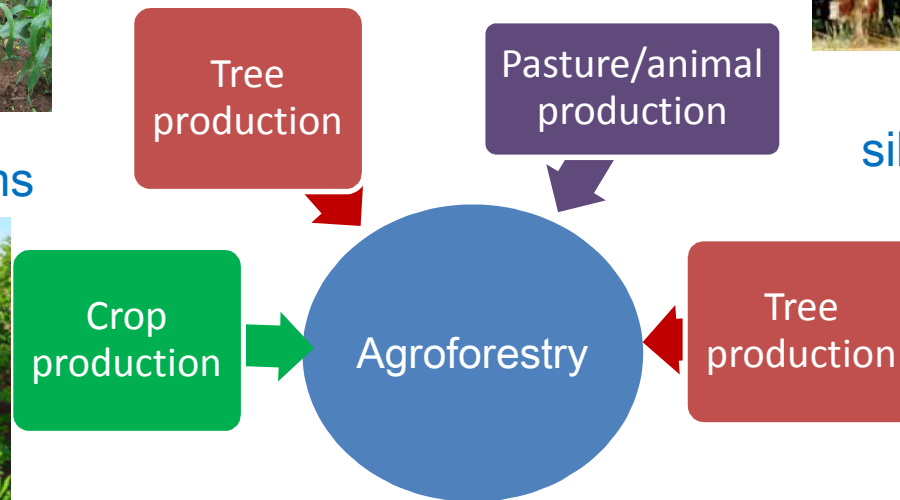
agrisilvicultural systems



agrosilvopastoral systems



silvopastoral systems



A variety of bioenergy and bioenergy feedstocks can be produced e.g. fuelwood, first and second-generation liquid biofuels, and biogas (under silvopastoral and agrosilvopastoral systems).

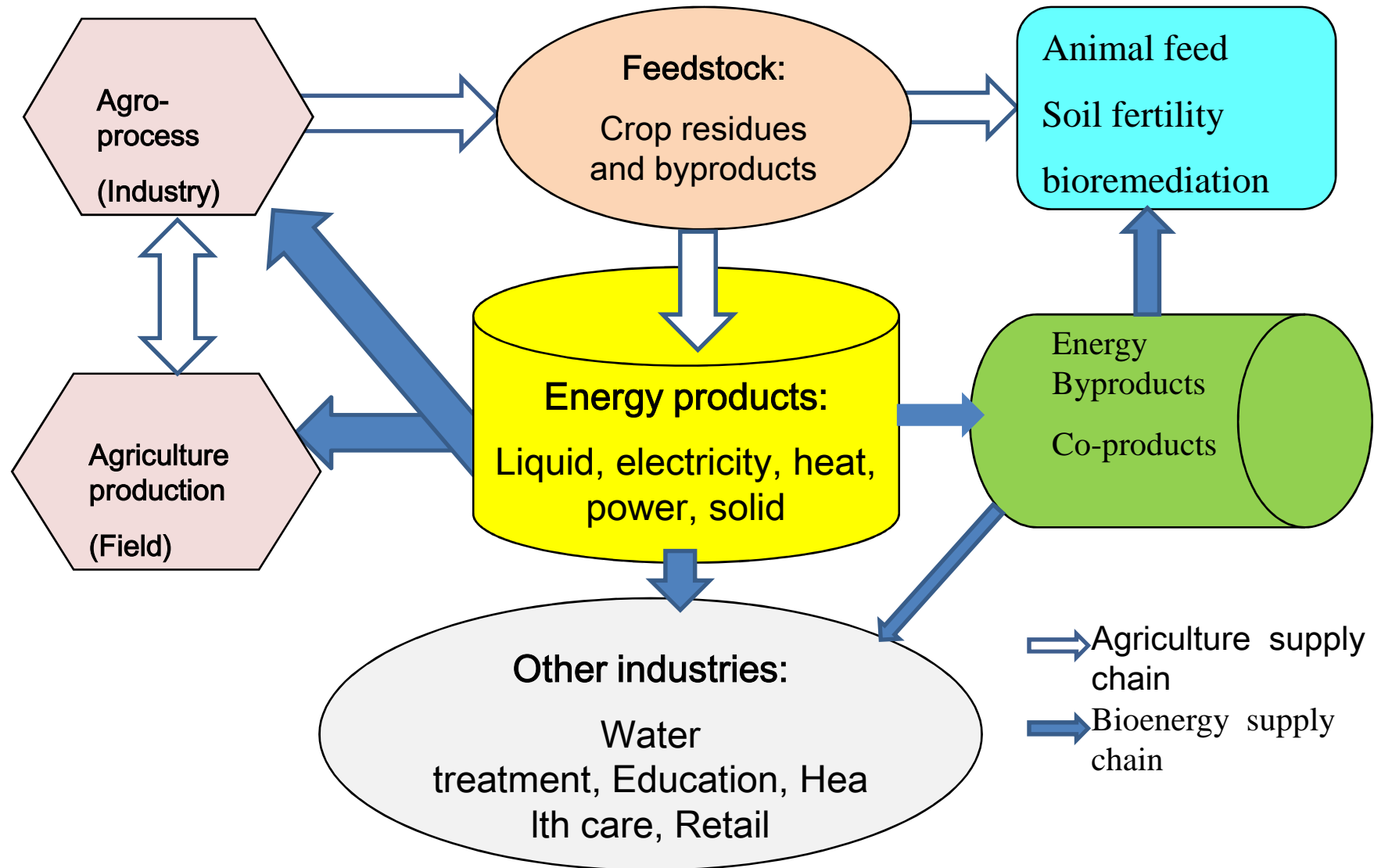


Postharvest Processing

- Transport, storage, food processing
- Inefficiencies in food processing => losses
 - Semi-mechanical processing of cassava and palm oil => Manual, inefficient
 - Limited by access to energy (electricity, diesel => bio-energy)



Services and infrastructure: transport, storage, market



Resources: water, land, labour, financial



International Markets



- Local sustainability a key focus of bio-energy in rural Africa => integration and benefits for increasing food production
- Bio-energy export
 - Land-use concerns (“land grab”)
 - Limited by market access, which actually promotes bio-energy export from the poorest
 - Link between local socio-economic development and bio-energy export requires significant attention

