ICCG Webinar Series on Water and Climate Change

Tackling complexity in a changing climate: the water-energy-food nexus in low income countries

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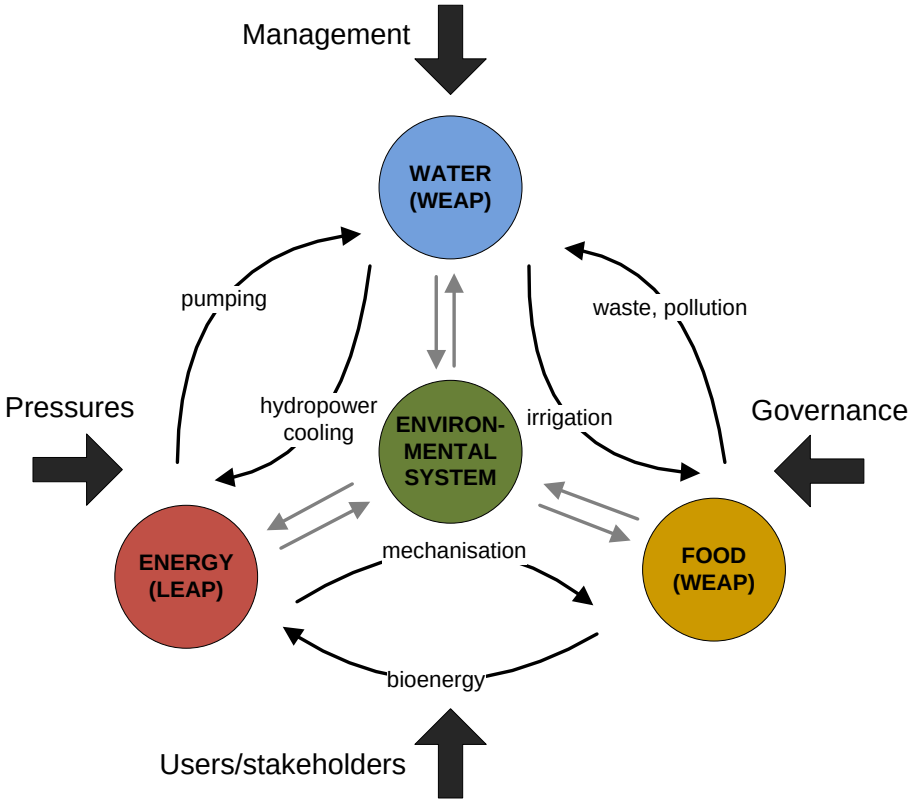
May 8th, 2015

The WEF nexus

Aim: addressing **inter-connected** water, energy and food development challenges at different levels, in order to enable those who govern and manage these systems to work together to meet **human aspirations**.



Communicating “the nexus” to partners and stakeholders in low-income countries

Agricultural Transformations and Energy Transitions

How are these two processes linked?

Climate change and the nexus

Climate change adaptation

- Agriculture: irrigation, changing growing seasons
- Energy: hydropower e.g. water availability

Climate change mitigation

- Agriculture: livestock
- Energy: renewable energy production

Low carbon futures / green economy plans

Cross-sector links – an example from Zambia

Issues:

- Energy access, food security – low yielding agriculture
- Deforestation + meeting environmental flow requirements

Drivers for change:

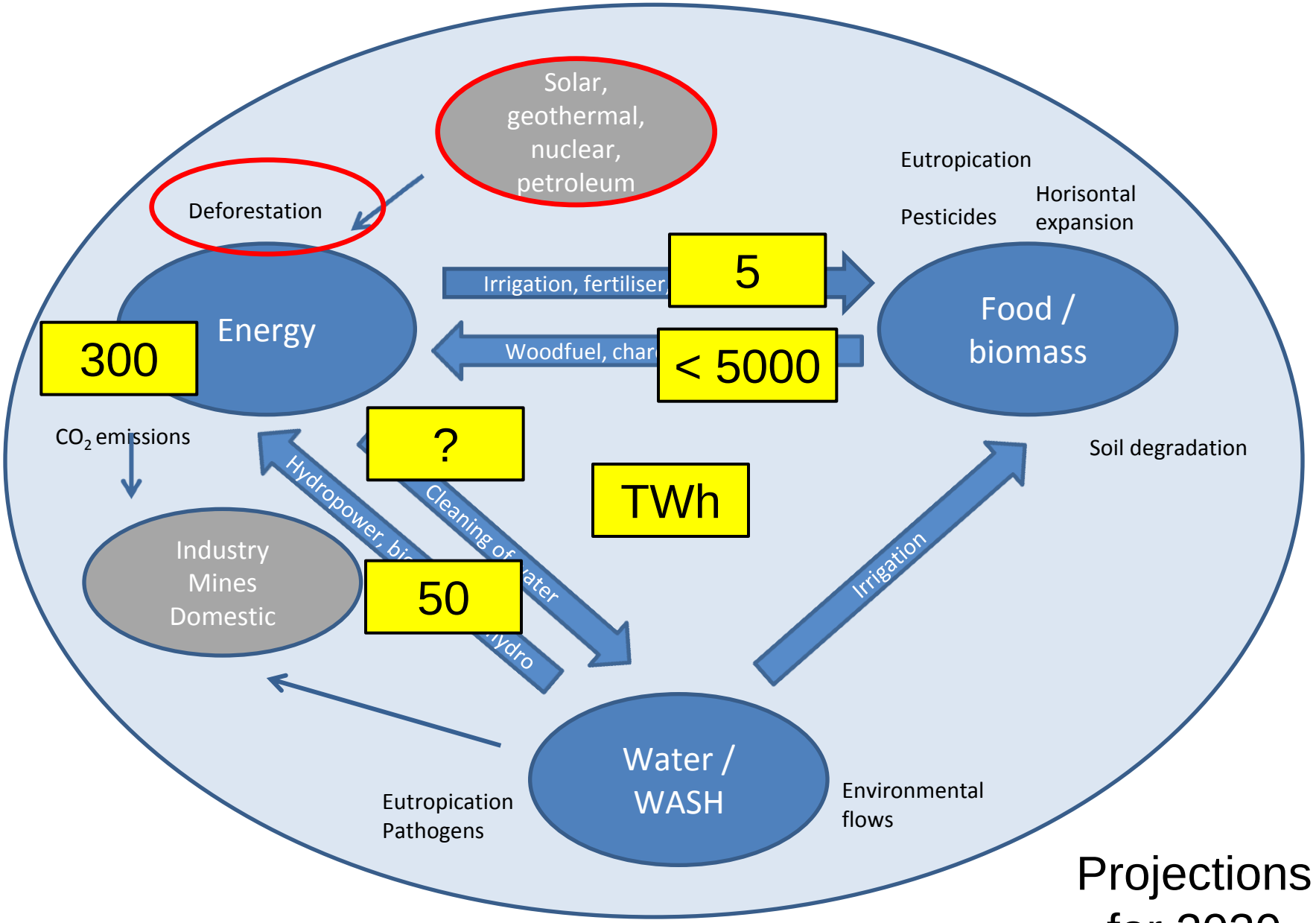
- Population + economic growth
- Climate change

Energy:

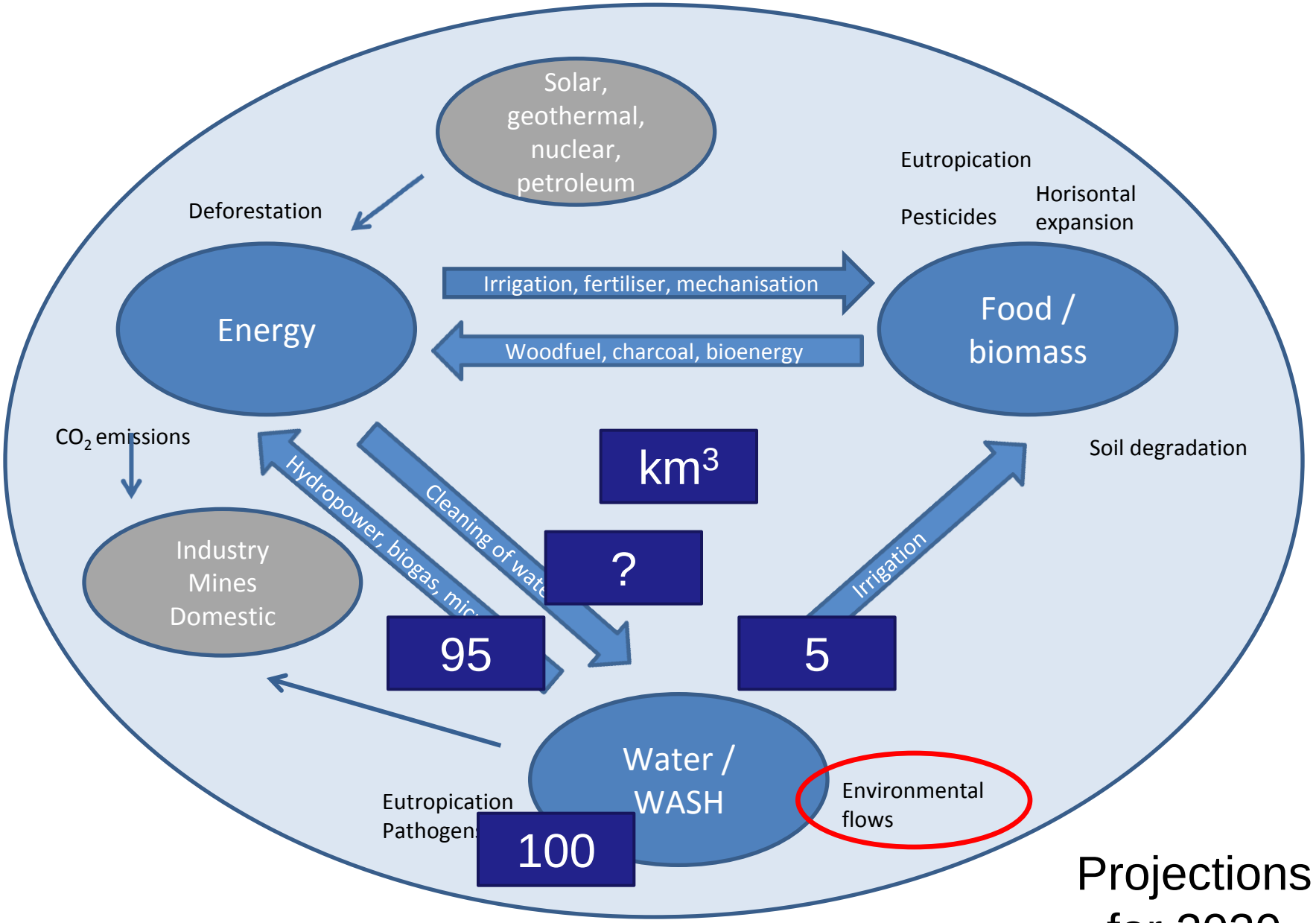
- Expansion of hydropower (from 1800 to 6000 MW)

Agriculture:

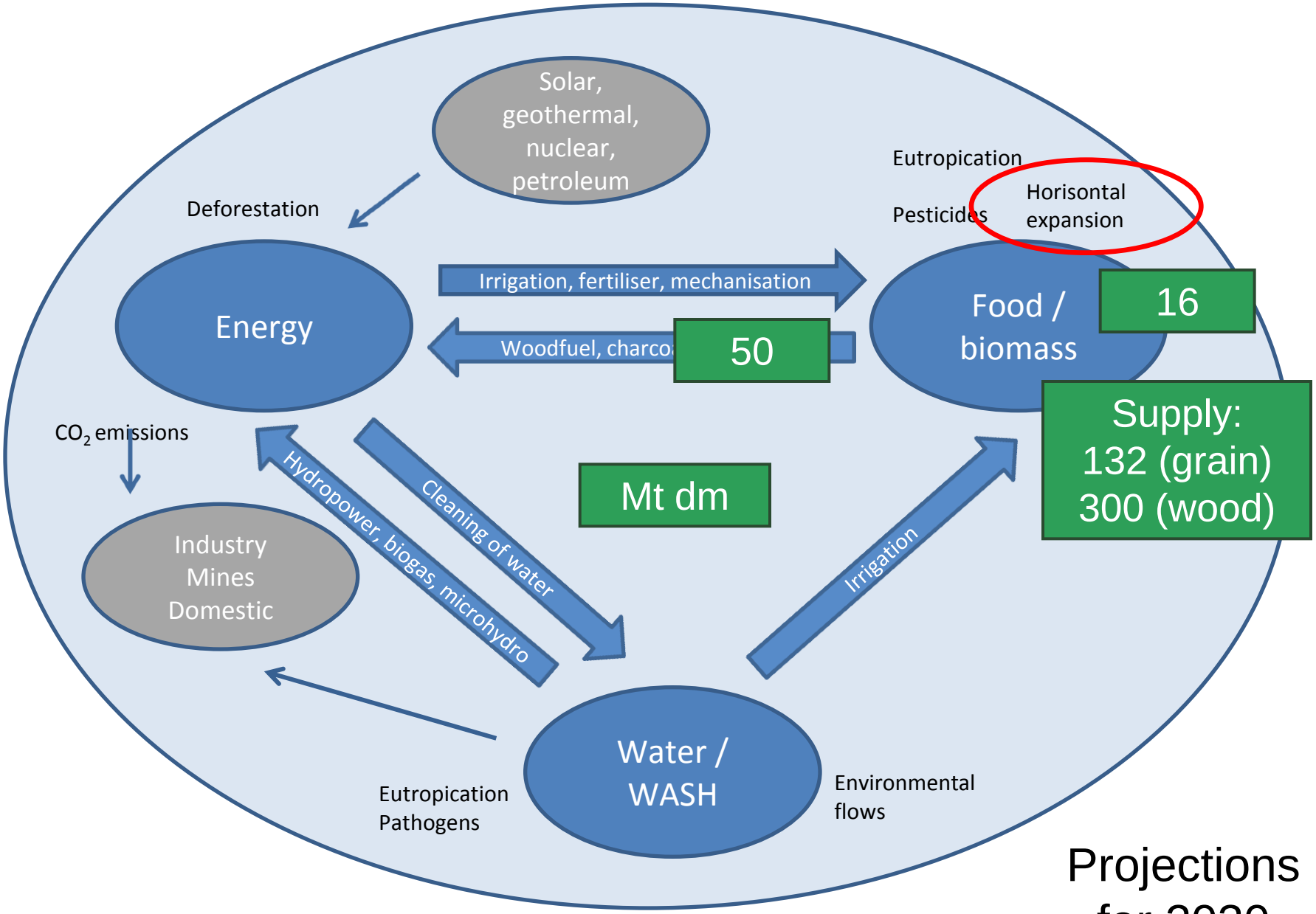
- Farm-blocks (up to 1 000 000 ha)



Projections for 2030



Projections for 2030



Projections for 2030

Conclusions Zambia

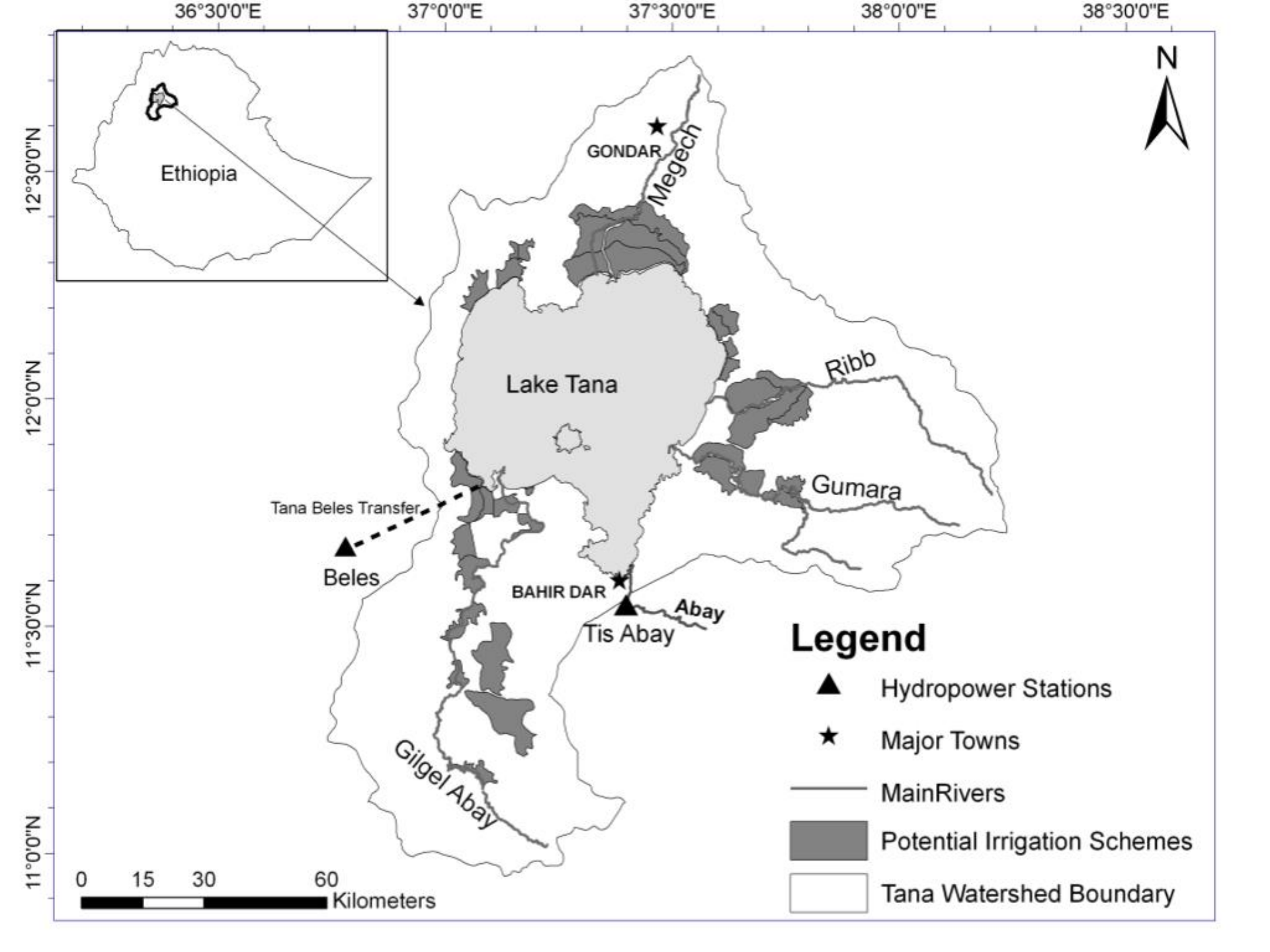
- Agricultural transformations: enough energy but energy access remains an issue
- Energy sector will continue to depend on biomass partly supplied by agriculture
- Agriculture and energy will compete for water in some locations and during certain times of the year
- Sustainability issues

Examples from a case study in Lake Tana, Ethiopia

- Development pathways
- Conflicting interests and aspirations
- Policy frameworks: CRGE, GTP

Climate change

Aim: Assess impacts of different development pathways on various stakeholder groups, after accounting for interactions between sectors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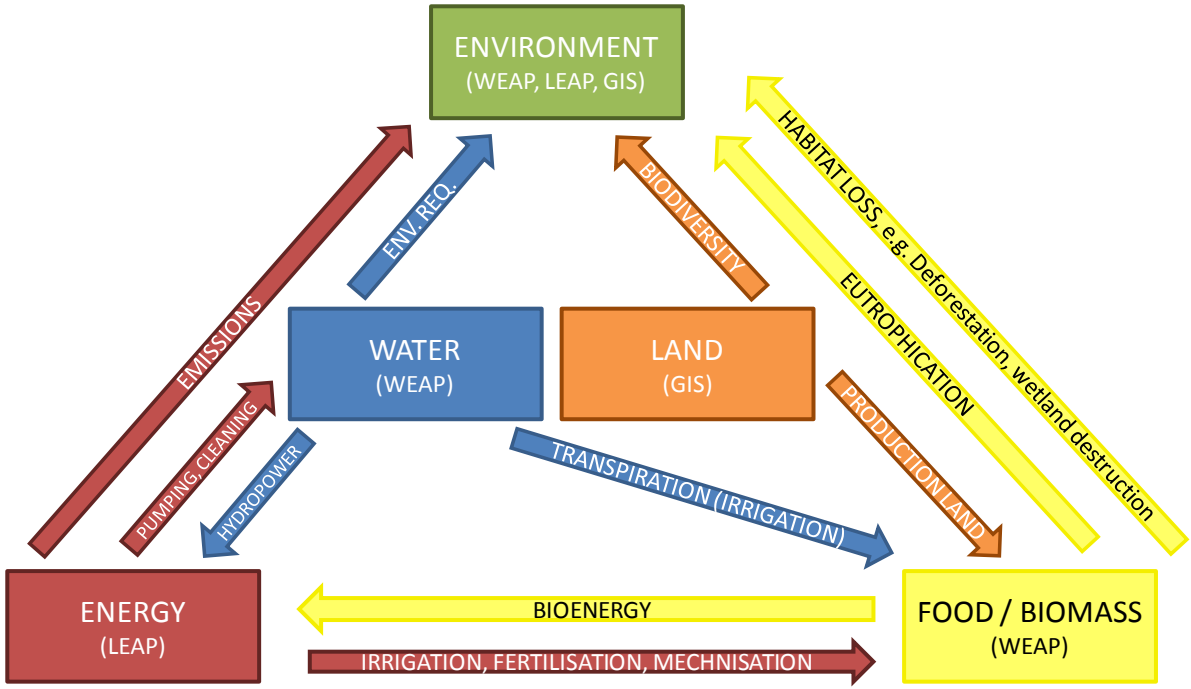
Ethiopia
GONDAR
Megech
Lake Tana
Ribb
Gumara
Tana Beles Transfer
Beles
BAHIR DAR
Abay
Tis Abay
Gilgel Abay
0 15 30 60
Kilometers
Legend
Hydropower Stations
Major Towns
MainRivers
Potential Irrigation Schemes
Tana Watershed Boundary

Methods

WEAP-LEAP: a nexus tool-kit

Joint learning: stakeholder participation



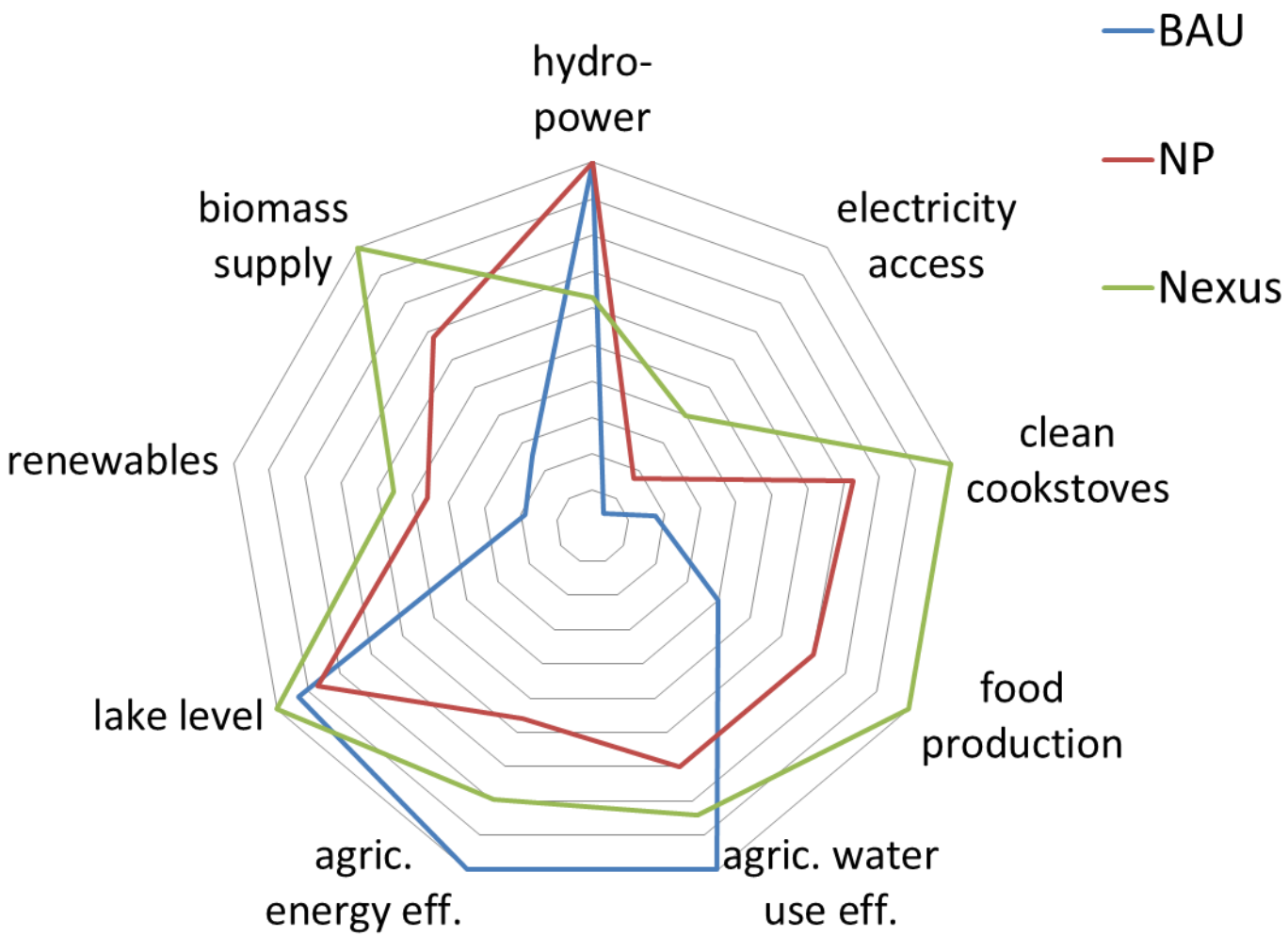
Three stories about the future

- Business as usual (BAU):
  slow development, low adoption of new technology
- National plans (Nat Plans):
  full adoption of technologies according to national policies
- Nexus (Nexus):
  resolving outstanding dilemmas, new policy and innovation needs

Population increase: same in all scenarios

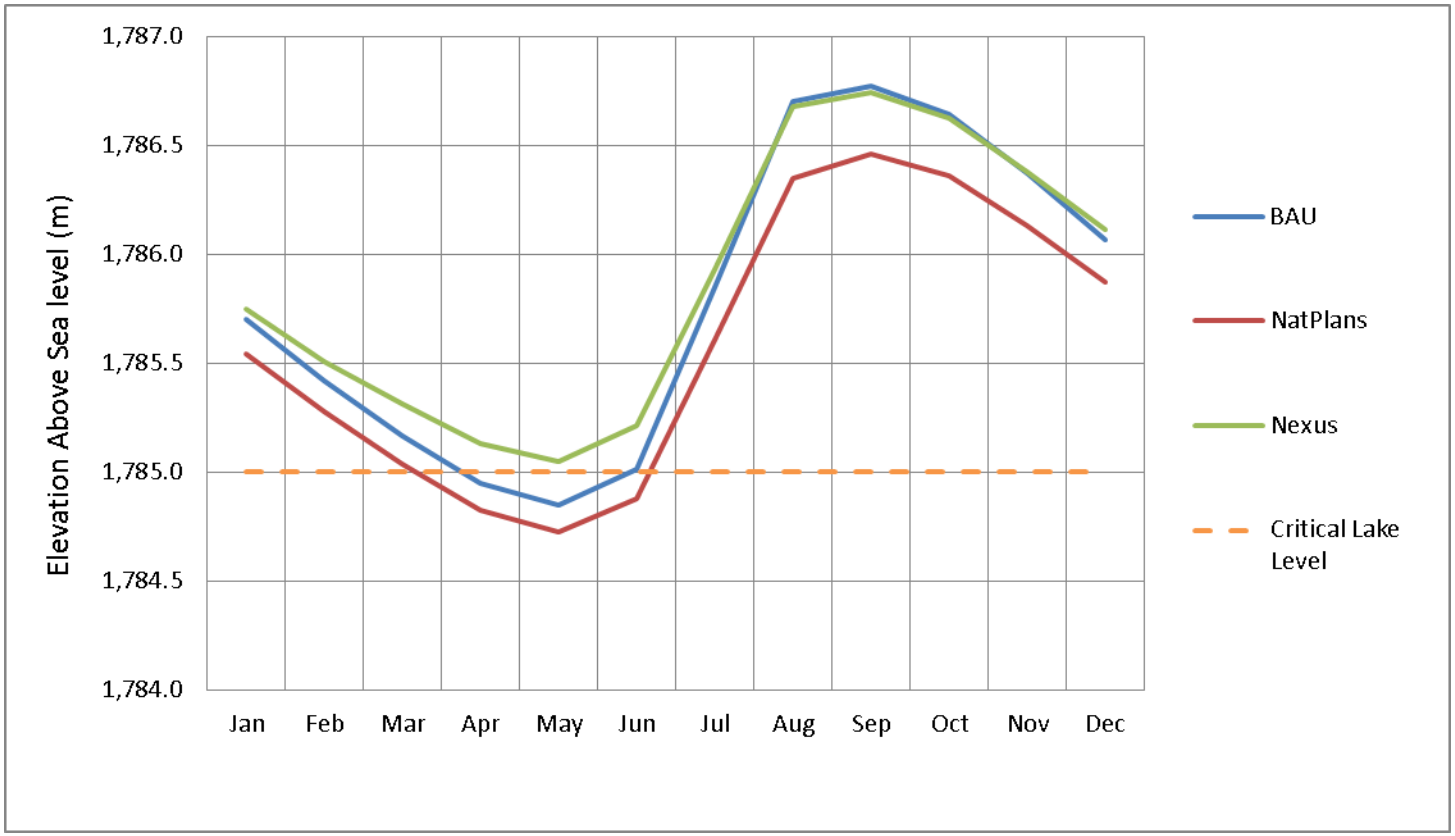
	BAU	Nat Plans	Nexus
Supply side management			
Agricultural inputs	Low (e.g. fertilization 65 kN/ha, 14% of croplands irrigated, tractors used on 50% of irrigated agricultural lands)	High (e.g. fertilization 250 kN/ha, 23% of croplands irrigated, tractors used on 50% of all (irrigated and non-irrigated) lands)	High (e.g. fertilization 250 kN/ha, 23% of croplands irrigated, tractors used on 50% of all (irrigated and non-irrigated) lands)
Crop residues	Unlimited use	Unlimited use	20% of above ground biomass returned to fields
Cow dung	Used as fuel	Used as fuel	Returned to fields
Demand side management			
Livestock population	Large (4.6 million TLU's[1])	Reduced (1.4 million TLU's[1])	Reduced (1.4 million TLU's[1])
Electrification	Low (6%)	Intermediate (17%)	High (40%)
Cook-stoves	Traditional stoves	Some improved stoves (1.6 million stoves)	Many improved stoves (1.9 million stoves)

Results

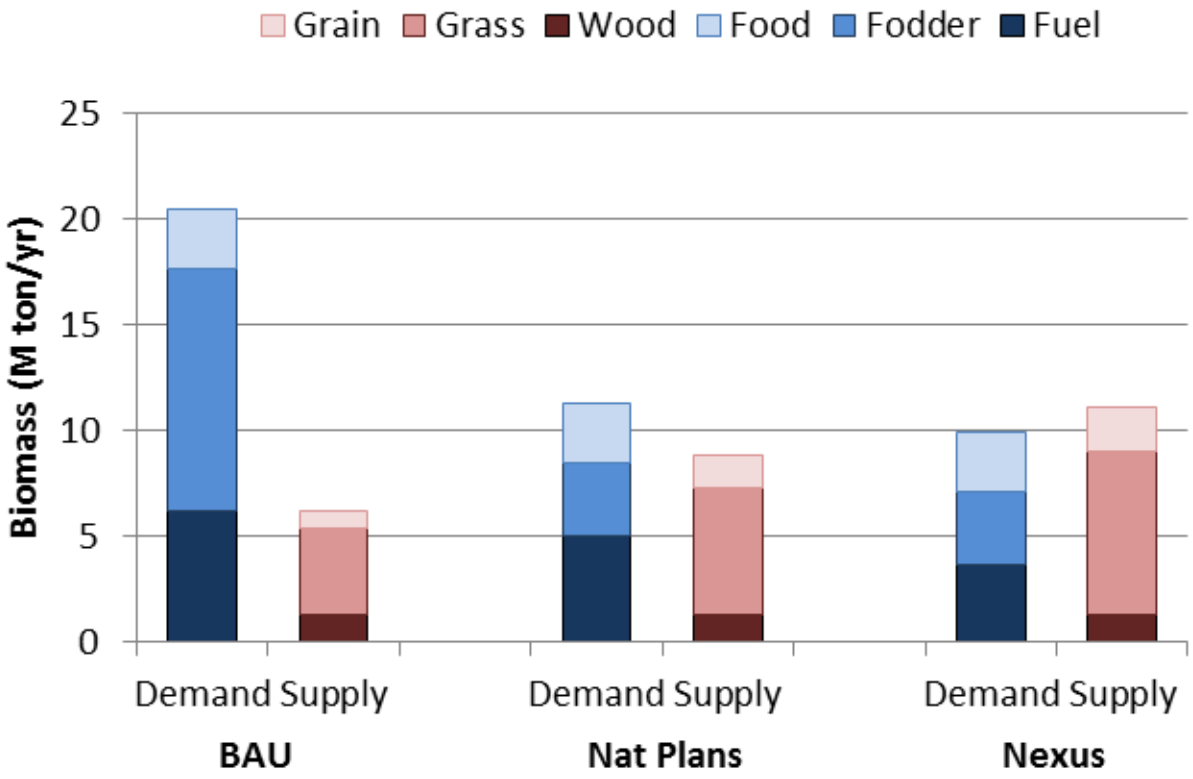

BAU
NP
Nexus
hydro-power
electricity access
clean cookstoves
food production
agric. water use eff.
agric. energy eff.
lake level
renewables
biomass supply

WATER

Total avg production 2010-2030 (GWh)	
BAU	1100
Nat Plans	1100
Nexus	600



BIOMASS


Grain
Grass
Wood
Food
Fodder
Fuel
Biomass (M ton/yr)
25
20
15
10
5
0
Demand Supply
BAU
Demand Supply
Nat Plans
Demand Supply
Nexus

Concluding remarks

- Indirect and direct links between energy transitions and agricultural transformations
- Resource competition between sectors: land and water cannot be substituted for food production
- Climate change: dictates transformation of energy and agricultural sectors
- Policy / planning implementation + new investments: need for cross-sector dialogue underpinned by quantitative assessments

Q&A

If you have any questions, please write us on the GoToWebinar chat.

For time management reasons, we don't assure that all questions will be answered.

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June 9th, 2015

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