Rapid ex-ante environmental impact assessment for livestock value chains

Ylva Ran, J. Morris, J. Barron
and M. Lannerstad

Agriculture for Food Security Post-2015
23-24 September 2015, Uppsala, Sweden

SEI STOCKHOLM ENVIRONMENT INSTITUTE

Outline

- Background
- CLEANED project – aims
- Conceptual framework
- Case study and preliminary results
- Case study conclusions
- Lessons learned and ways forward
- Discussion points

Livestock environmental impacts

Land

Global livestock sector uses about 70 % of agricultural land (FAO 2009)

33% all croplands (Steinfeld et al. 2006)

Water

~ 30 % total agricultural water demand (Mekonnen & Hoekstra 2012)

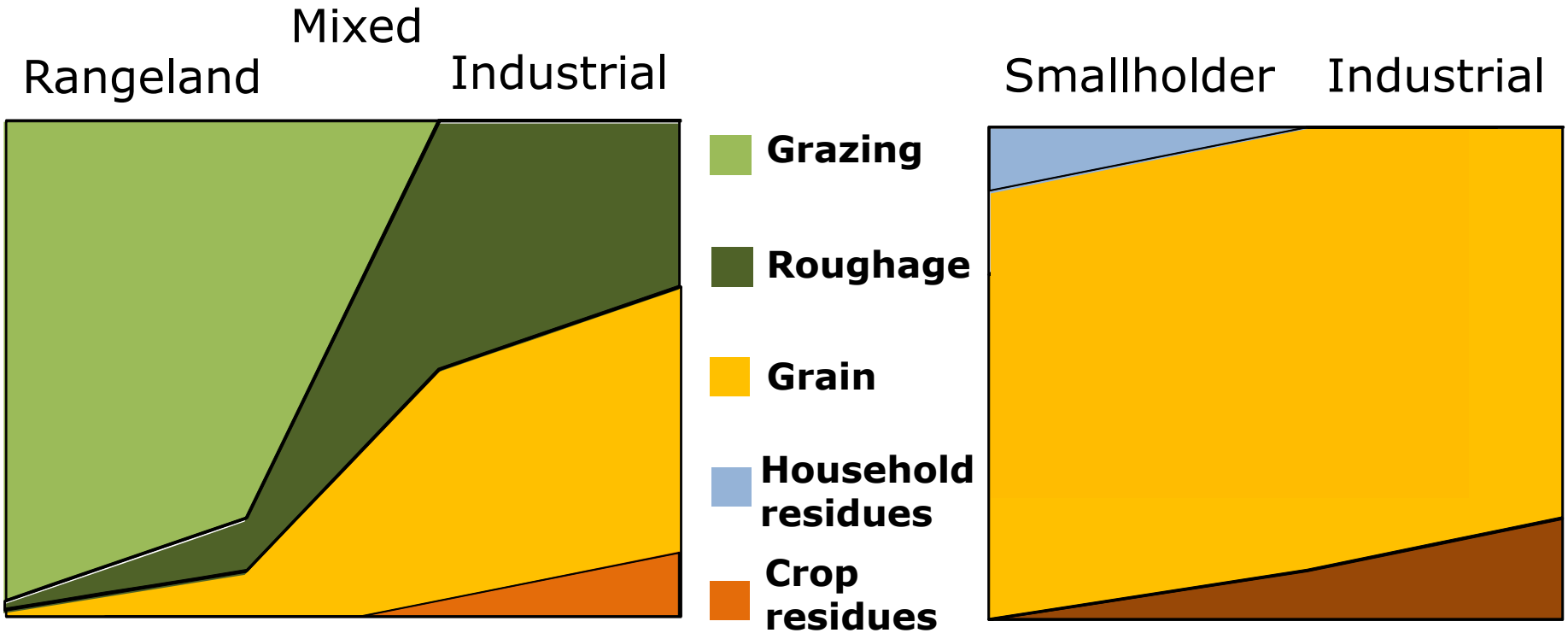
GHGs

14.5 % anthropogenic GHG emissions,

65% cattle (meat/milk/manure/draft power)

- feed production & processing 45 %
- enteric fermentation 39 %
- manure storage & processing 10 % (FAO 2013)

Impacts differ with systems



Ruminants

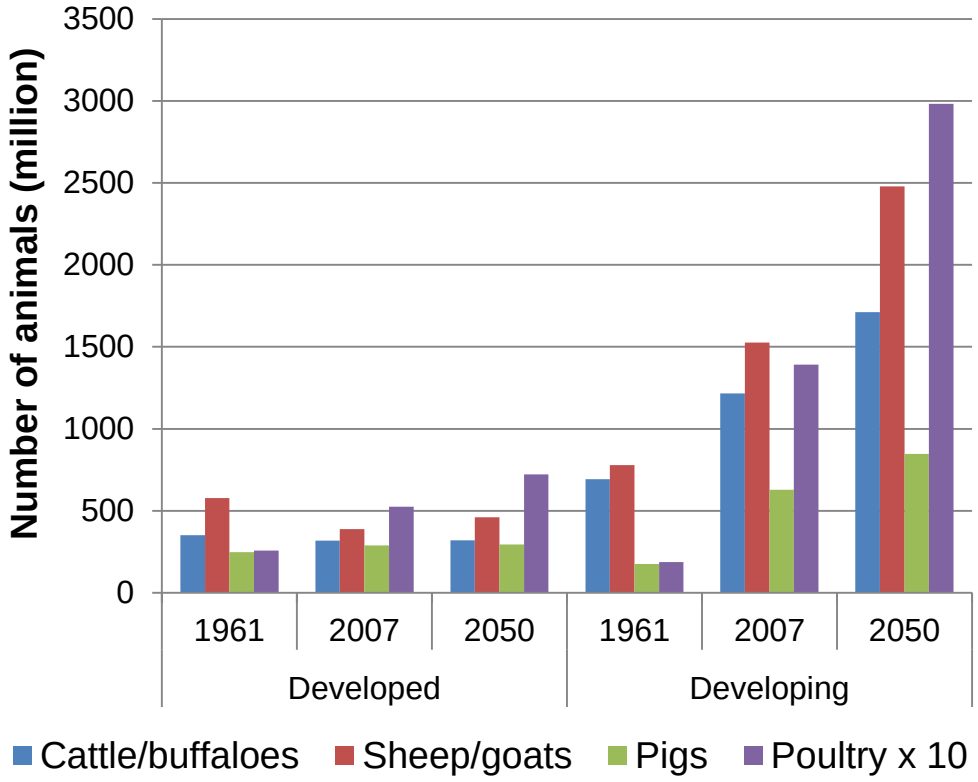
Cattle, sheep, goats
- meat & dairy

Monogastric animals

Pigs & poultry
- meat & egg

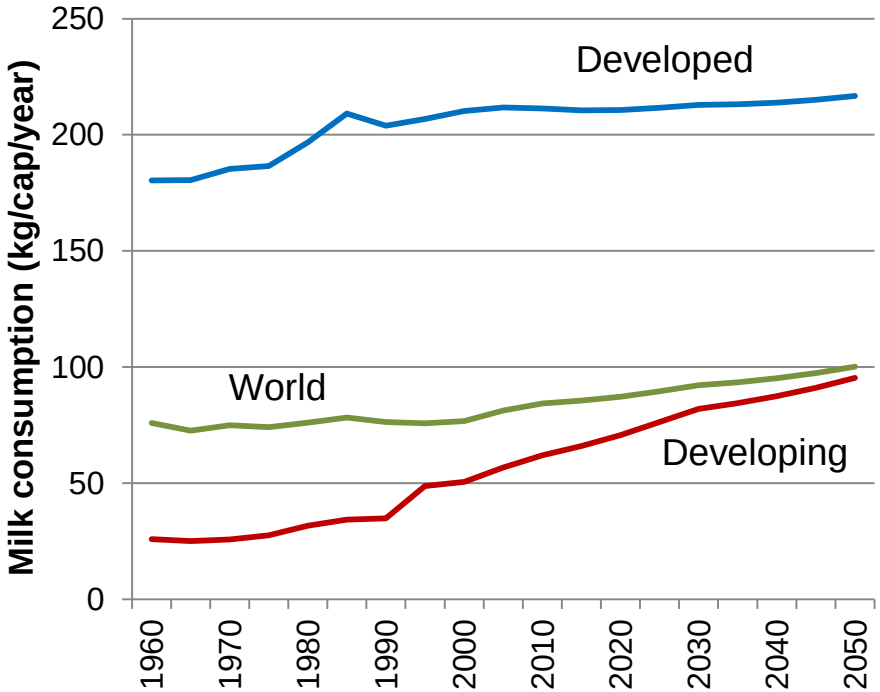
Livestock production/consumption 1960-2050

Number of animals (million)



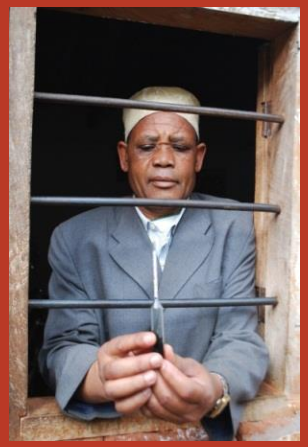
Milk

(kg / capita & year)



(FAOSTAT 2011, Alexandratos 2006, 2009)

CLEANED: A framework for environmental ex-ante impact assessment of livestock value chains



ILRI

CSIRO

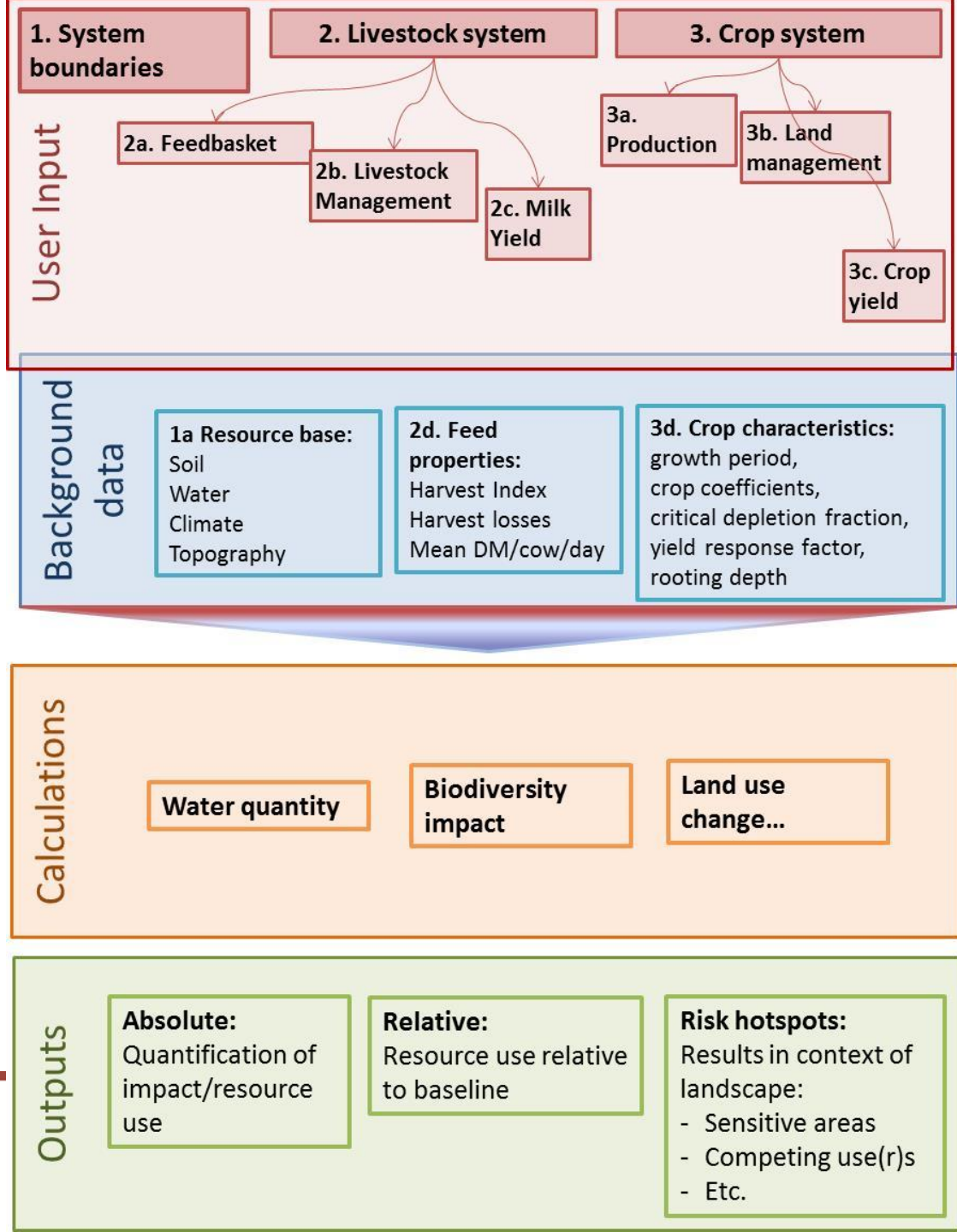
CIAT

SEI STOCKHOLM ENVIRONMENT INSTITUTE

Pathways and key indicators

1. Water availability and quality:
   - Appropriation of available resources
   - Change in soil water holding capacity
   - Change in water quality
2. Soil and land health:
   - Soil erosion
   - Change in soil organic matter
   - Change in soil fertility
3. GHG emissions:
   - Total emissions of methane, nitrous oxide, carbon dioxide
4. Biodiversity loss:
   - Species diversity
   - Landscape multi-functionality

Rapid ex-ante environmental framework



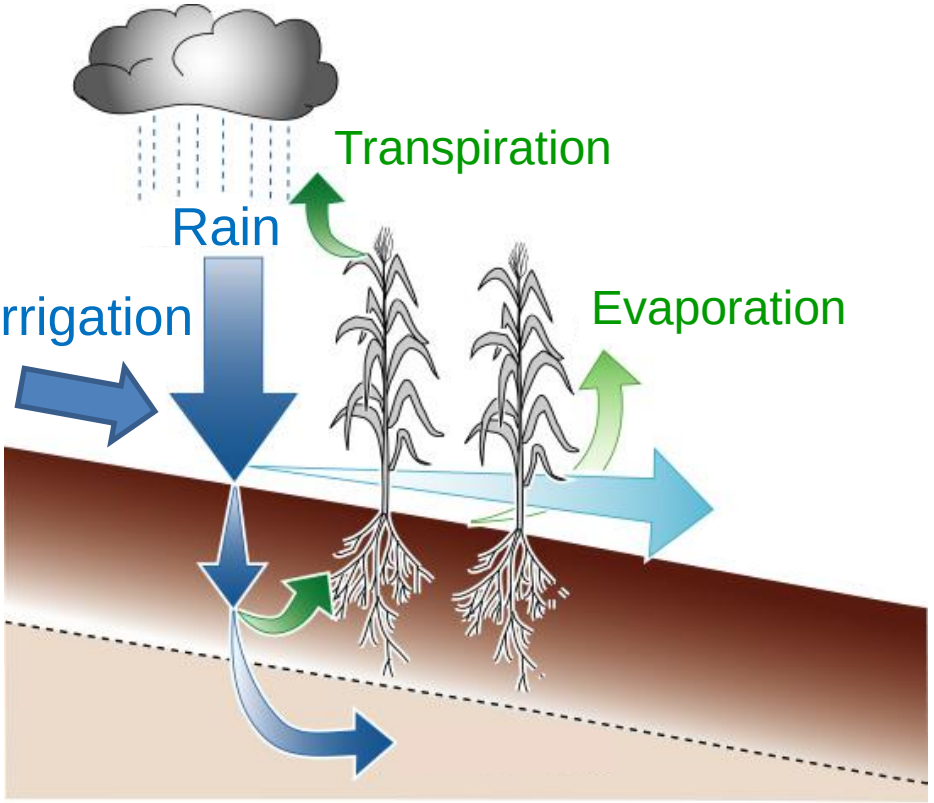
SEI STOCKHOLM ENVIRONMENT INSTITUTE

A pilot study on smallholder dairy value chains in Lushoto district, Tanzania

SEI STOCKHOLM ENVIRONMENT INSTITUTE

Water impact pathway for dairy cattle

(Photo: Peden 2006)



(Rockström)

Drinking, service etc.
≈ 2%

Crops & Grazing
≈ 98%

water source

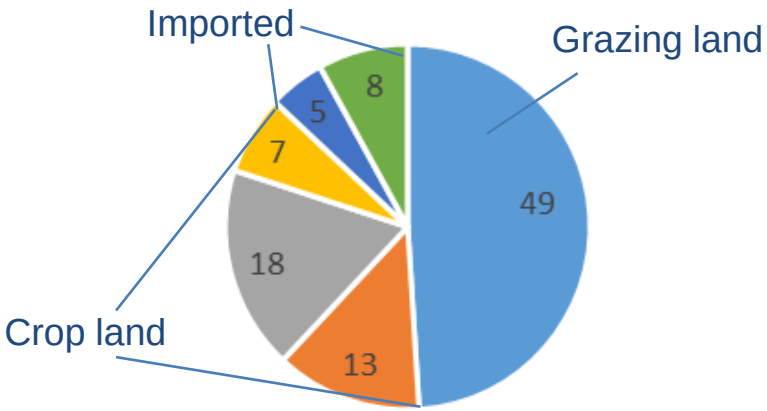
blue

Cropland: blue | green

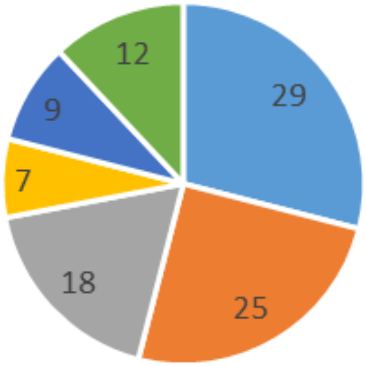
Pasture: green

Feedbasket change across systems and scenarios

Baseline



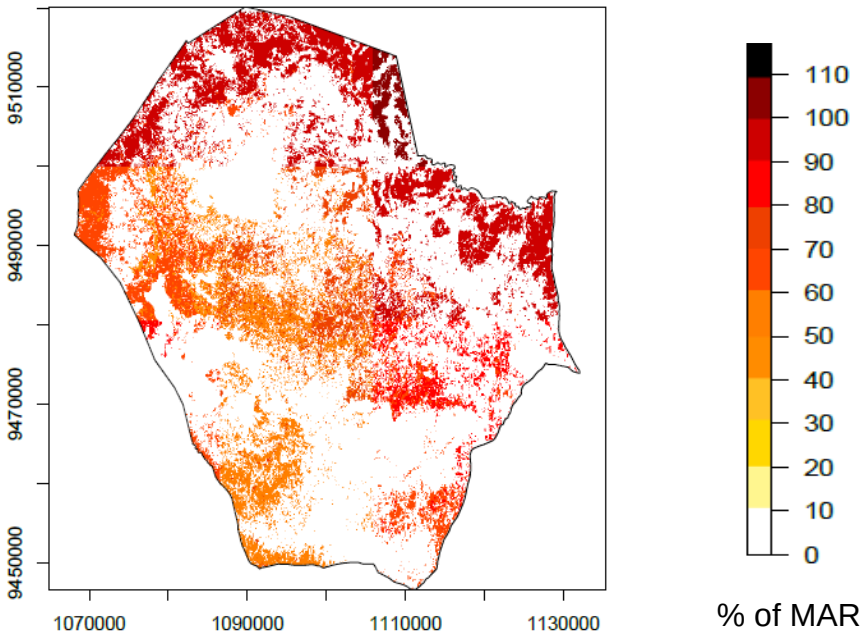
Scenario – improved feeding

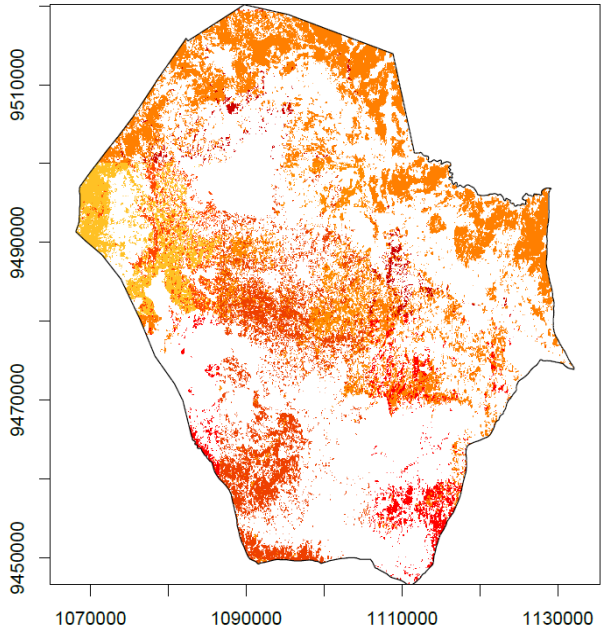


- Natural grass
- Cereal residues (%)
- Concentrates from cereals
- Planted fodder
- Legume residues (%)
- Concentrates from oilseed crops

Preliminary results for Lushoto district

Total water requirement/rainfall





Baseline
1,250 litre milk per cow and year
Largely grassfed
Water productivity 17,000 m3/l milk

Scenario
1,250 litre milk per cow and year
Improved feeding
Water productivity 13,000 m3/l milk

Case study conclusions

- Rapid assessments require general assumptions – large uncertainties
- Current impact only relative change

  – need to connected better to baseline
- Difficult to identify ”thresholds” and trade-offs between pathways
- Data constraints
- Complex systems

Lessons learned and ways forward

- Model developing to capture change in SWHC
  – important for rainfed smallholders
- Assess all four impact pathways together
  – environmental impact trade-offs
- Increased production and/or improved feeding
  – can result in need for feed imports
  – environmental impacts exported?
- Test CLEANED for other animal types
- Develop user interface

Discussion points

- Impact assessment tools, for whom? Based on assumptions that current and future practices may be unsustainable?
- Do we need resource management tools or do we need productivity management tools?
- Rapid assessment vs. detailed assessments?
- What is commercial? Is commercial related to scale or to management?

Thank you for listening!