

# Broadening the scope of sustainability assessment

South American soy as a plea

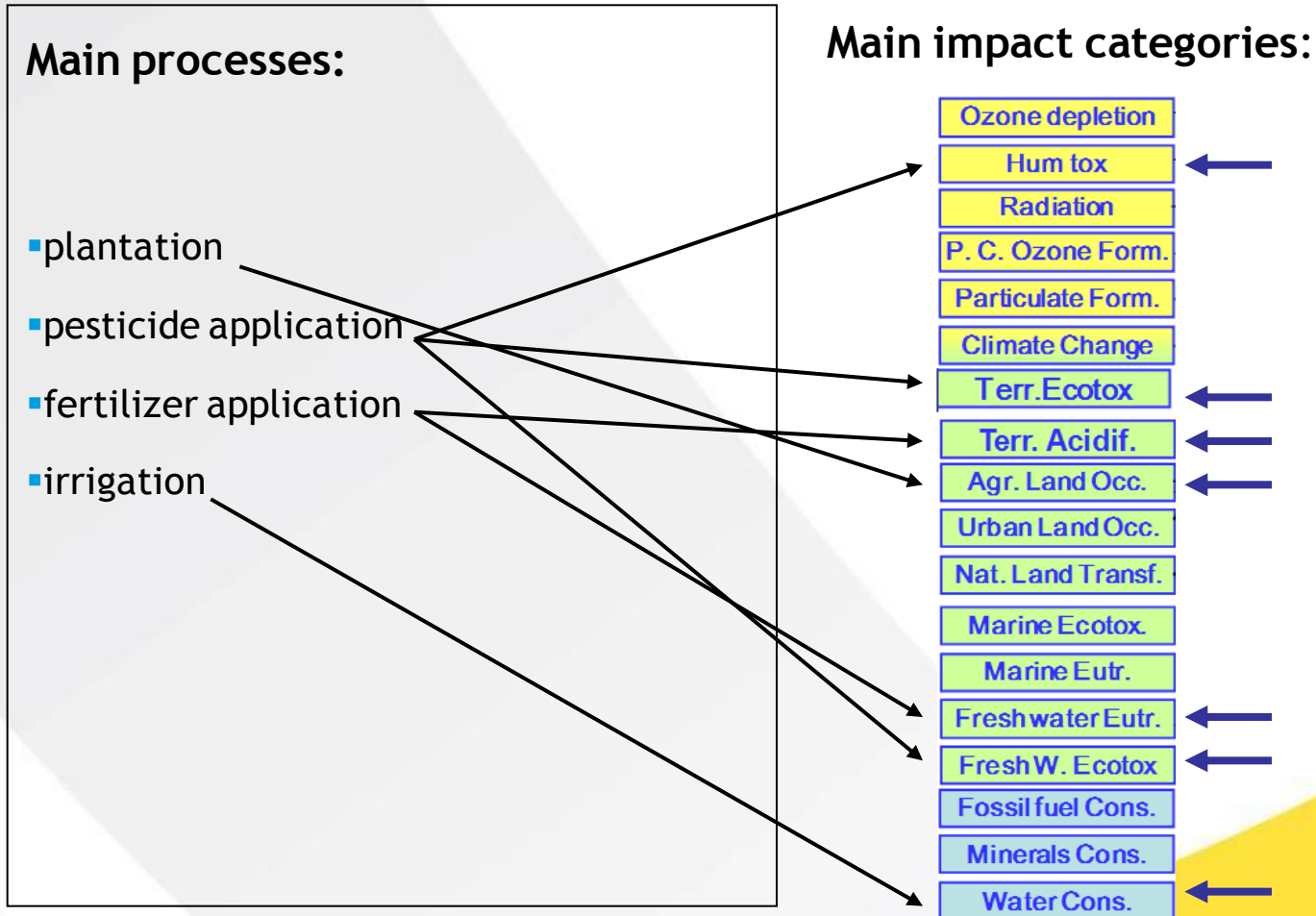
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## ▶ This presentation:

Agriculture and sustainability:

- Top-down perspective (general): LCA of agricultural products
- Bottom-up perspective: soy in South America
- Top-down perspective (specific): LCA of soy and soy alternatives
- Towards a combined perspective
- Conclusions

# Top-down perspective (general): LCA of agricultural products



# ▶ Bottom-up perspective: soy in South America 1

[map (left out because of possible copyright)]

Brazil: Growth of soy production area 1995-2003  
More than 300% in some areas, especially in the amazon

## ▶ Bottom-up perspective: soy in South America 2

### *Background:*

- Application of soy: mainly animal fodder
- Increased international demand
- Increased technical possibilities for large-scale production by Roundup Ready soy

## ▶ **Bottom-up perspective: soy in South America 3**

### **Environmental effects:**

- deforestation of the Amazon
- human health problems, caused by intoxication with pesticides

# Bottom-up perspective: soy in South America 4

## Social and economic effects

- very poor working conditions in forest clearing
- local peasants driven away
  - violence; social structures disrupted
  - economic problems: *the rich get richer and the poor get poorer*
  - food security endangered



Eviction of Tekojoja, Paraguay, 2004



Camp of the landless, Paraguay, 2004

# Bottom-up perspective:

## ▶ soy in South America 4

### Possible solution:

Replacing South American soy (partly) by fodder crops from Europe

- Soy in Europe: generally not economically feasible
- Alternative: other grain legumes (peas, field beans)

# ▶ Top-down perspective (specific) 1: LCA of soy and soy alternatives

## *Questions to be addressed:*

- What does LCA say about South American soy and about European grain legumes?
- Are the observed problems in South America covered by LCA?

## *2 types of LCA-studies available:*

- Studies on products with soy and/or European grain legumes in their life cycles (e.g. meat)
- LCA studies on South American soy versus European grain legumes

# Top-down perspective (specific) 2: LCA of soy and soy alternatives

## Points of attention:

- System boundaries
- Selection of impact categories
- Mentioned separately?
- Included in overall assessment and conclusions?
- *Potential impacts versus risks/actual impacts*

- Ozone depletion
- Hum tox
- Radiation
- P. C. Ozone Form.
- Particulate Form.
- Climate Change
- Terr. Ecotox
- Terr. Acidif.
- Agr. Land Occ.
- Urban Land Occ.
- Nat. Land Transf.
- Marine Ecotox.
- Marine Eutr.
- Fresh water Eutr.
- Fresh W. Ecotox
- Fossil fuel Cons.
- Minerals Cons.
- Water Cons.

# ▶ Top-down perspective (specific) 3: LCA of soy and soy alternatives

## Deforestation

- Impact category: *land conversion*.
- Functional unit ↔ converted area?
- Implicit weighting
- Irreversible losses

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## Example:

*There were no overall advantages from the feed alternative containing European grain legumes (...) Clear benefits could only be found regarding the resource use-driven impacts due to less transport, reduced incorporation of energy rich feeds and absence of land transformation.*

(From an LCA study by Baumgartner *et al.* (2008) on meat, milk and eggs.)

***Loss of rain forest may easily be overlooked or underestimated in LCA case studies!***

# ▶ Top-down perspective (specific) 4: LCA of soy and soy alternatives

Toxicity assessment in LCA

Integration of concentrations over space and time

- Grade of dilution
- Readily degradable ↔ persistent pesticide
- Local population density

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## Toxicity assessment in LCA

Integration of concentrations over space and time

- Grade of dilution
- Readily degradable ↔ persistent pesticide
- Local population density

→ *N.B.: risks and actual human toxic effects!*

*This type of toxicity assessment is valid only  
as long as safety thresholds are not exceeded!*

# ► Towards a combined perspective 1: LCA case studies

## *General points to be addressed:*

- System boundaries
- Selection of impact categories
- Effects that cannot be easily quantified in terms of LCA
- Weighting

## *Specifically*

- LCA of meat/dairy/eggs
- Deforestation
- Actual toxic impacts and risks

## ► Towards a combined perspective 2: LCA methodology

### *Areas of attention for methodology development:*

- Land conversion ↔ functional unit
- Local effects
- Actual toxic impacts and risks
- Rules for LCA case studies:
  - System boundaries
  - Selection of impact categories
  - Effects that cannot be easily quantified in terms of LCA
  - Weighting

⇒ **Prevention of false conclusions**

# ▶ Towards a combined perspective 3: LCA in relation to sustainability assessment

*Areas of attention for methodological extension:*

- Social impacts
- Economic impacts

## ▶ Conclusions

*Full sustainability assessment includes at least:*

- LCA
- assessment of local effects
- assessment of actual toxic effects and risks
- assessment of social impacts
- assessment of economic impacts