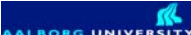


LCA as a means to assess land use implication of new production priorities

Third LaSyS Workshop
26th of October 2007

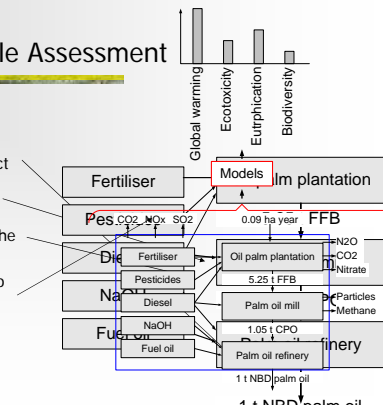
Jannick Hoejrup Schmidt
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Aalborg University, DK
<http://www.plan.aau.dk/~jannick/>



LCA – Life Cycle Assessment

What is an LCA?

- Environmental assessment of a product
- Life cycle perspective
- Accounting for all emissions throughout the life cycle
- Compiles emissions into environmental impacts

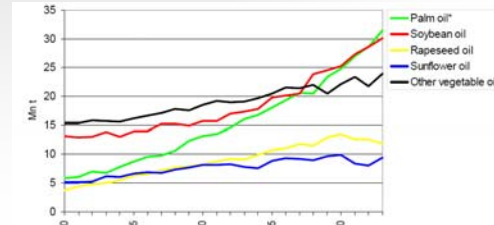


Why LCA as a means to assess land use implications?

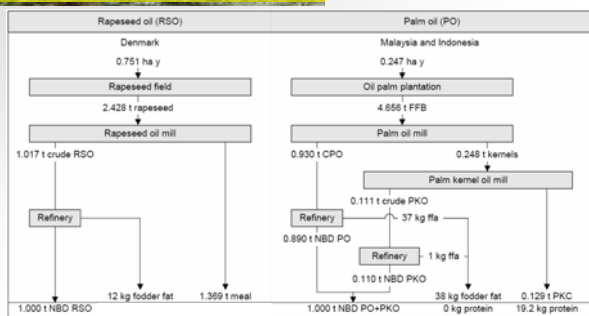
- LCA
 - Cause-effect mechanisms from decisions to impact
 - Predicts impacts from (policy) decisions
 - Investigated system: Engineering/market approach
 - Modelling of impacts: Natural science

Case: rapeseed oil and palm oil

- Most important oils: Palm, soybean (constrained), rapeseed
- High growth rate (Biodiesel and increasing food intake)
- Significant land use impacts in EU and SE-Asia

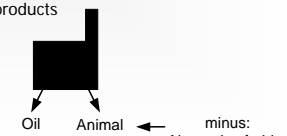


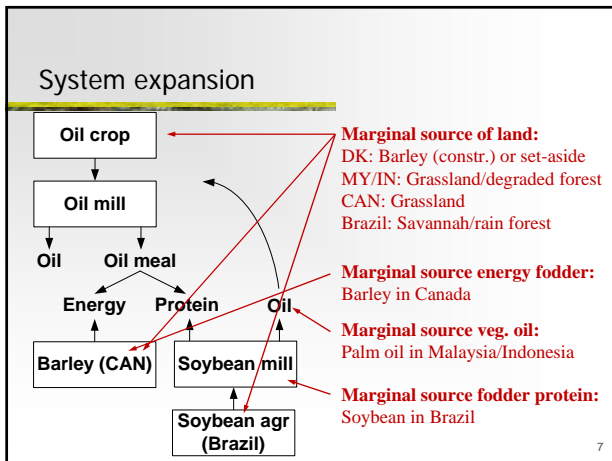
Product system: rapeseed oil and palm oil



System delimitation

Two challenges:

- Agr. Stage: Land use change – how?
 - 1 ha rapeseed in DK => ÷ 1 ha barley in DK + x ha barley in ?
 - 1 ha rapeseed in DK => ÷ 1 ha set-aside in DK
- Oil mill stage: Handling of co-products
 



System expansion – solving the loop

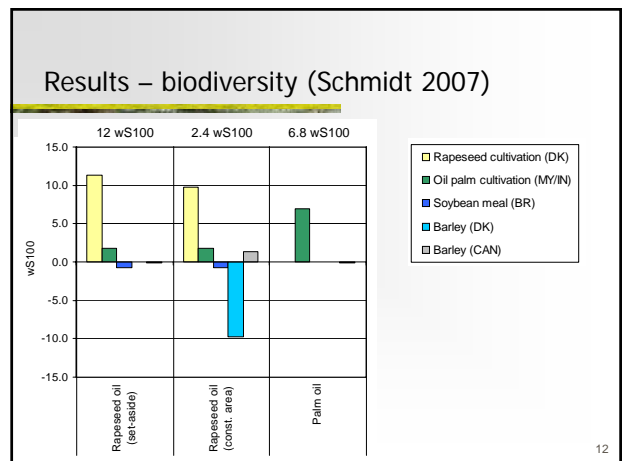
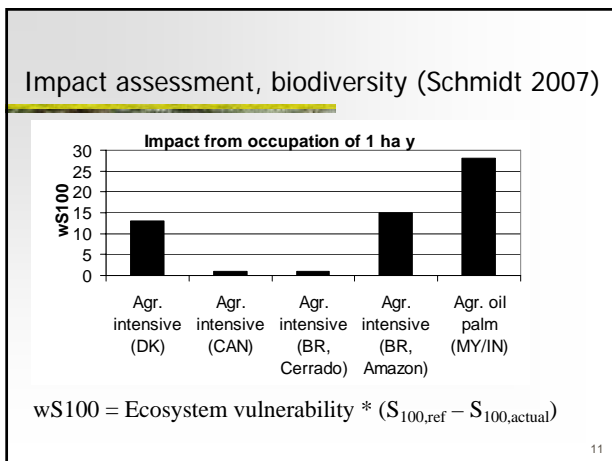
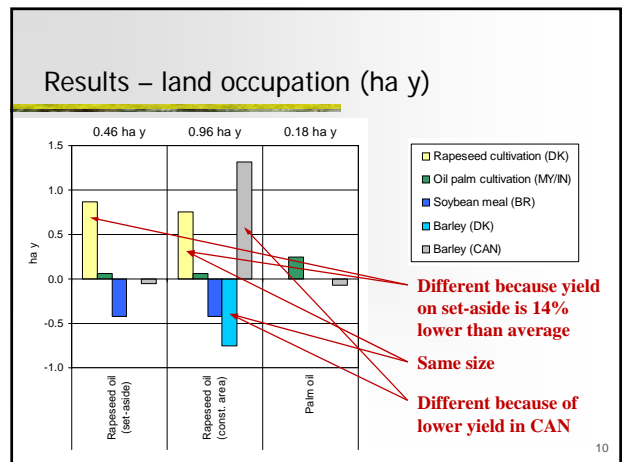
1 t rapeseed oil

$$1 \text{ t RSO} \begin{bmatrix} 1 \text{ t oil/t RSO} \\ -465 \text{ kg prot./t RSO} \\ 1,362 \text{ SFU/t RSO} \end{bmatrix} + \text{tPO} \begin{bmatrix} 1 \text{ t oil/t PO} \\ 19.2 \text{ kg prot./t PO} \\ 191 \text{ SFU/t PO} \end{bmatrix} + \text{tSM} \begin{bmatrix} 0.244 \text{ t oil/t SM} \\ -436 \text{ kg prot./t SM} \\ 1,207 \text{ SFU/t SM} \end{bmatrix} + \text{tBL} \begin{bmatrix} 0 \text{ t oil/t BL} \\ 91.8 \text{ kg prot./t BL} \\ 952 \text{ SFU/t BL} \end{bmatrix} = \begin{bmatrix} 1 \text{ t oil} \\ 0 \text{ kg prot.} \\ 0 \text{ SFU} \end{bmatrix}$$

System expansion – inventory results

Oil mill/refinery stage	1 t rapeseed oil	1 t palm oil
Rapeseed (DK)	2.43 t	0 t
FFB (MY/IN)	1.19 t	4.66 t
Soybean (BR)	-1.35 t	-0.0032 t
Barley (CAN)	-0.16 t	-0.20 t

All stages	Rapeseed, set-aside	Rapeseed, constr.	Oil palm
Rapeseed (DK)	2.43 t	2.43 t	0 t
Barley (DK)	0 t	-3.85 t	0 t
FFB (MY/IN)	1.19 t	1.19 t	4.66 t
Soybean (BR)	-1.35 t	-1.35 t	-0.0032 t
Barley (CAN)	-0.16 t	3.69 t	-0.20 t



Perspectives

- LCA has showed to provide new insight in how products affect land use in different regions
- Land use compiled into impacts (biodiversity)
- Important issues:
 - What is marginal land? (forest, grassland or set-aside)
 - Which regions represent marginal supply
 - Which agricultural practises in these regions reflect the marginal suppliers (yield)
 - Increased demand may marginally be met by increased yield?
 - There are different ways to measure biodiversity

Background material <http://www.plan.aau.dk/~jannick/>

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