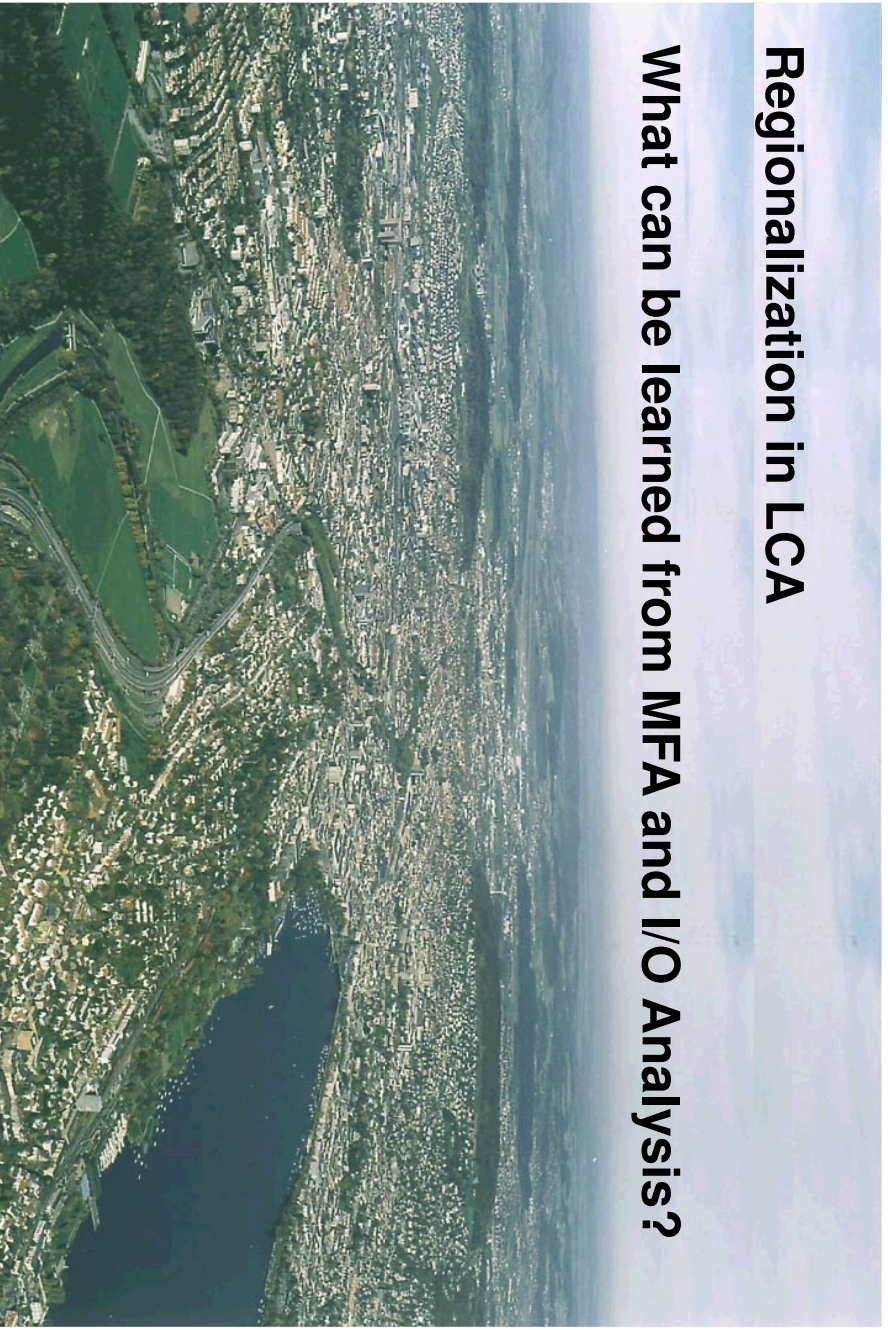


Regionalization in LCA

What can be learned from MFA and I/O Analysis?



Prof. Dr. S. Kytzia, Hochschule für Technik Rapperswil

1. Definition	2. Motivation	3. Methods	4. Lessons learned
Regionalization = Defining the system by setting spatial boundaries	Spatial boundaries agree with political entities.	Combination of bottom-up and top-down approaches.	Modeling not accounting! Advantages in multi-level system analysis and hybrid modeling. Size of political entities limits insights into resource management. Advantages in combining the analysis of stocks and flows.



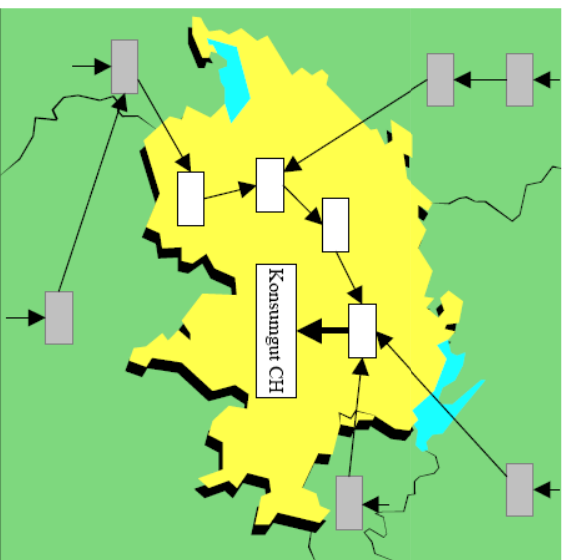
1. Definition

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regionalization = defining the system by setting spatial boundaries



Example taken from
Junghluth et al. (2007), Graue
Treibhausgas-Emissionender
Schweiz 1990-2004, Bern.



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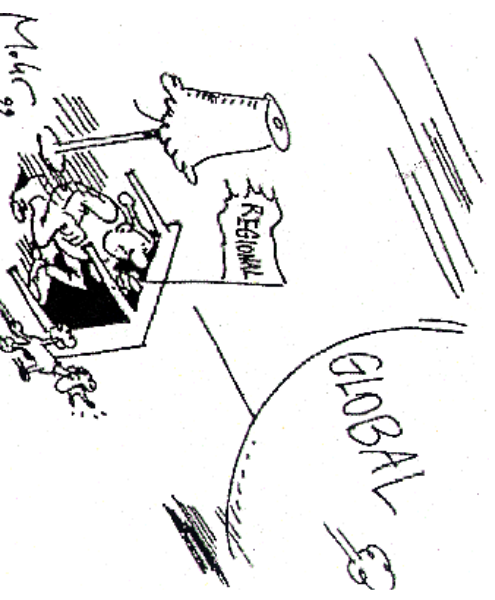
Spatial boundaries agree with political entities.

Pragmatic:

- Political entities provide statistic data,
- Political entities set the agenda (incl. funding).

Normative:

- concept of
«good governance»
(Baccini and Bader 1996).



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Combination of bottom-up and top-down approaches.

Input-Output-Analysis

= Model for flows of commodities and services between different industries as well as industries and households in an economic system – mostly represented in monetary units.

Input-Output-Tables (IOTs) are the corresponding accounting schemes.

- National IOT: Combines data from national statistics.
- Regional IOT: Takes estimates from existing Input-Output-Tables for comparable economies and «fits» the model with regional/local data.



1. Definition

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Combination of bottom-up and top-down approaches.

Material Flow Analysis (MFA)

= Model for flows and stocks of materials (substances as well as goods or «bulk materials») in a system defined by a selection of processes in a defined spatial system over a given period of time – in some cases corresponding to a certain human need (e.g. to nourish).

Material Flow Accounting (MFA) is one option for a corresponding accounting scheme.

- MFA: Combines data for technical processes with all kinds of statistical data. Data validation is very important – mostly based on model analyses.



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Examples for technical data

Daten	Ertrag kg/ha	N-Dünger g/kg Ertrag	P-Dünger g/kg Ertrag
Schweden	4'200	25.00	4.76
Schweiz	6'500	16.92	3.69
Deutschland	5'000	24.00	3.60
Durchschnitt	5'230	22.00	4.00
Streuung	22%	20%	16%

Example taken from
 Faust, M. (2000). Ressourceneffizienz in der Aktivität
 Ernährung: Akteurbezogene Stoffflussanalyse. Zürich,
 Eidgenössische Technische Hochschule Zürich: 145.



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Examples for other data sources

Abverkauf Davos Rätia & Davos Dorf Jahr 2004		Boss Bedarfsbereich		Boss Adv. Umsatz Inkl.		Abv. Umsatz inkl.		Abv. Umsatz exkl.		Abv. Umsatz		Abv. Umsatz		Abv. Umsatz		Abv. Umsatz		
		Bedarfsbereich	01.01	MMSt Fr.	1'125'191.27	reduziert Fr.	26'028.15	MMSt Fr.	1'098'127.97	Abv. Umsatz	Stk./kg	Messmenge kg	Abv. Umsatz	Stk./kg	Messmenge kg	Abv. Umsatz	Stk./kg	Messmenge kg
SUESSWAREN			01.01		376'480.45		8'823.55		367'656.21	126'132.000		75'099.541		31'690.689		30'668.448		52'095.589
BISCUITS			01.02		974'962.80		22'850.65		962'112.15	281'876.000		93'966.746		6'084.264		47'075.059		29'448.979
FRUHSITUFECK/MARMGETRÄN			01.03															
BACKSCHI																		
TK-HOUSE																		
GETRÄNK																		
BELLAGEN																		
EIER																		
KONSERVEN																		
WOLKEREI/PRODUKTE																		
APERRO																		
KAESERHEKEN																		
TIERWEIT																		
REG ARTIK																		
GEMÜSE																		
BROT/FEIN																		
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1. Definition

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Modeling not accounting!

IOA/IOT and MFA integrate different data sources into a consistent model for an economy or resource management system on national or regional scale.

Modeling is a great help in data integration

- validation,
- error propagation,
- sensitivity analysis.

Don't stop at accounting – start modeling!



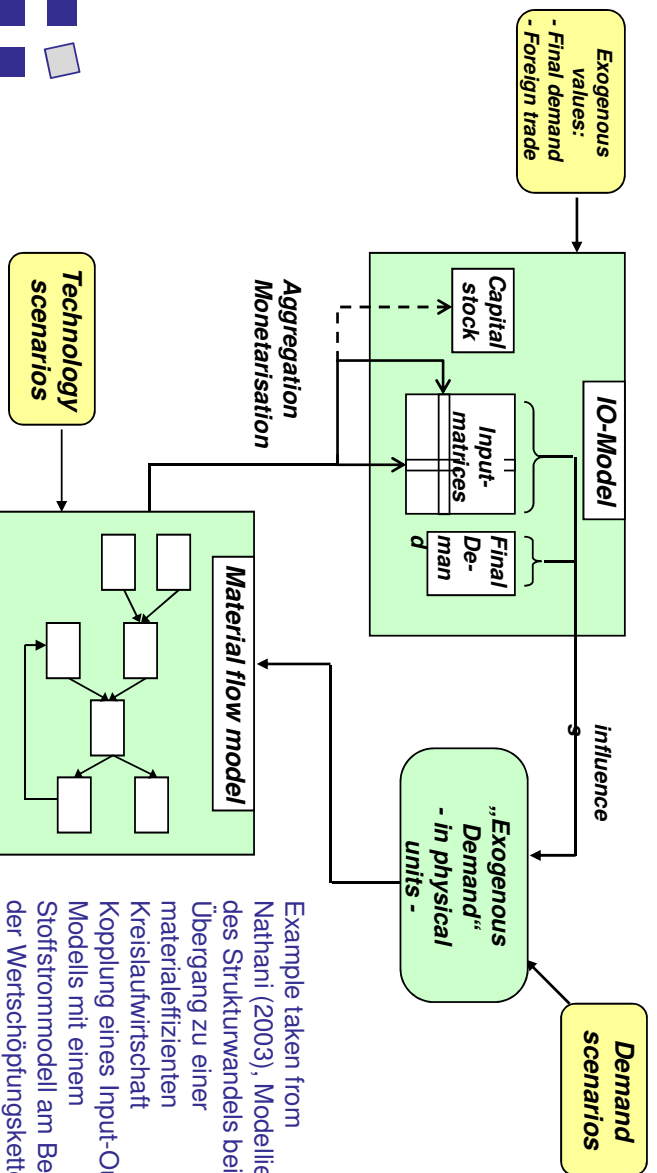
1. Definition

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Advantages in multi-level system analysis and hybrid modeling



Example taken from Nathani (2003), Modellierung des Strukturwandels beim Übergang zu einer materialeffizienten Kreislaufwirtschaft
Kopplung eines Input-Output-Modells mit einem Stoffstrommodell am Beispiel der Wertschöpfungskette "Papier". Physika. Verlag.



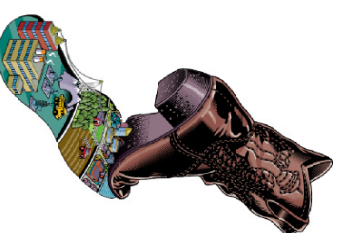
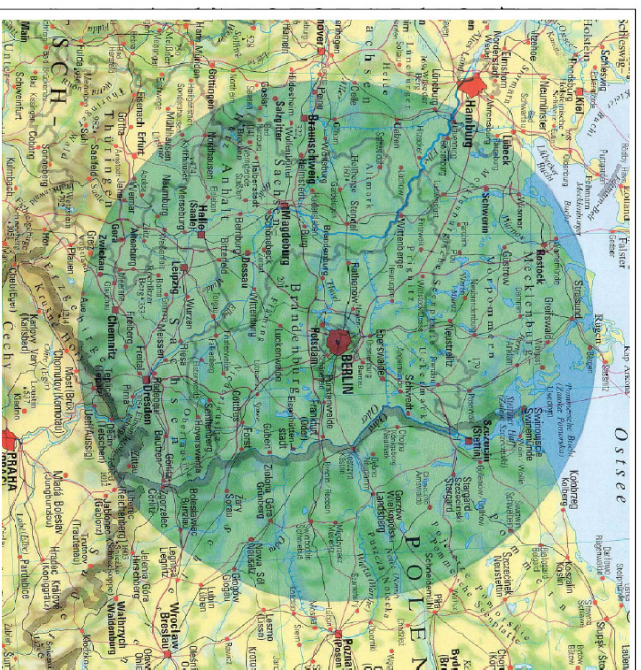
1. Definition

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Advantages in multi-level system analysis and hybrid modeling



Example taken from
<http://www.agenda21berlin.de>



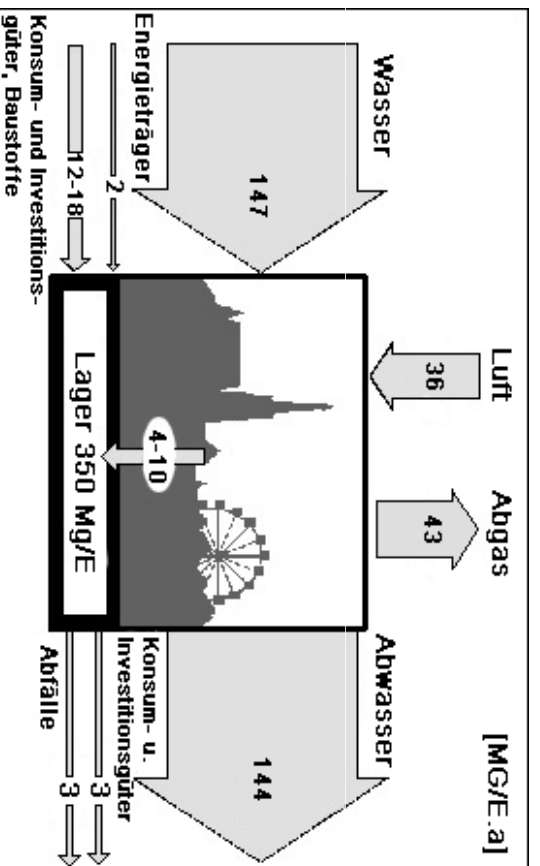
1. Definition

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Size of political entities limits insights into resource management.



Example taken from

<http://www.magwien.gv.at/umweltschutz/nachhaltigkeit/fussabdruck/berichte.html>

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Size of political entities limits insights into resource management.

Example taken from Frey and Schaltegger (2000), AREA Access to Regional Economic Approaches, S. 3-7.

Wirkung auf BSP in	Massnahme in			
	Belgien	Frankreich	Deutschland	Italien Niederlande
<i>Erhöhung der Staatsausgaben (um 5 %)</i>				
Belgien	0,81	0,34	0,49	0,28
Frankreich	0,31	2,57	1,53	1,07
Deutschland	0,14	0,88	1,64	0,47
Italien	0,21	0,69	0,56	1,81
Niederlande	0,16	0,20	0,24	0,22
<i>Senkung der Steuern (um 5 %)</i>				
Belgien	0,67	0,32	0,61	0,32
Frankreich	0,25	2,44	1,92	1,21
Deutschland	0,11	0,84	2,05	0,53
Italien	0,18	0,66	0,70	2,04
Niederlande	0,13	0,19	0,30	0,25

Tabelle 3.2: Prozentuale Zunahme des nationalen Bruttozialprodukts auf Grund von Ausgabenerhöhungen bzw. Steuerensenkungen (Quelle: Resnick 1968, 193)



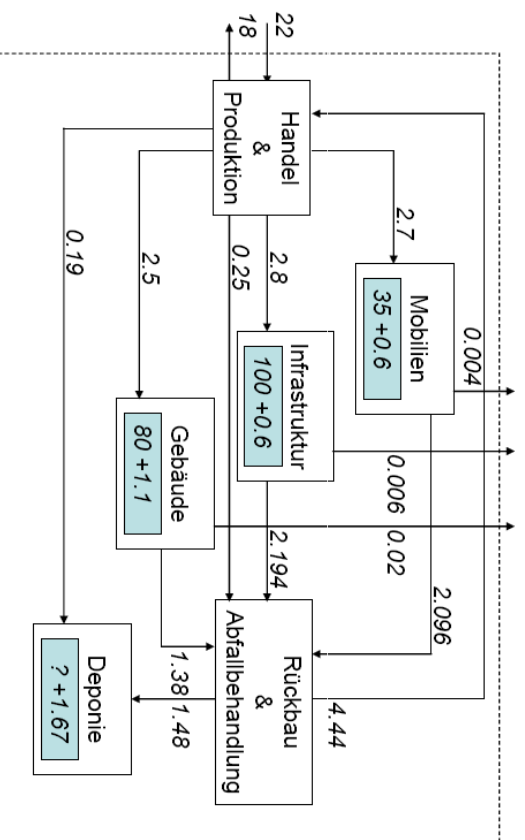
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Advantages in combining the analysis of stocks and flows.



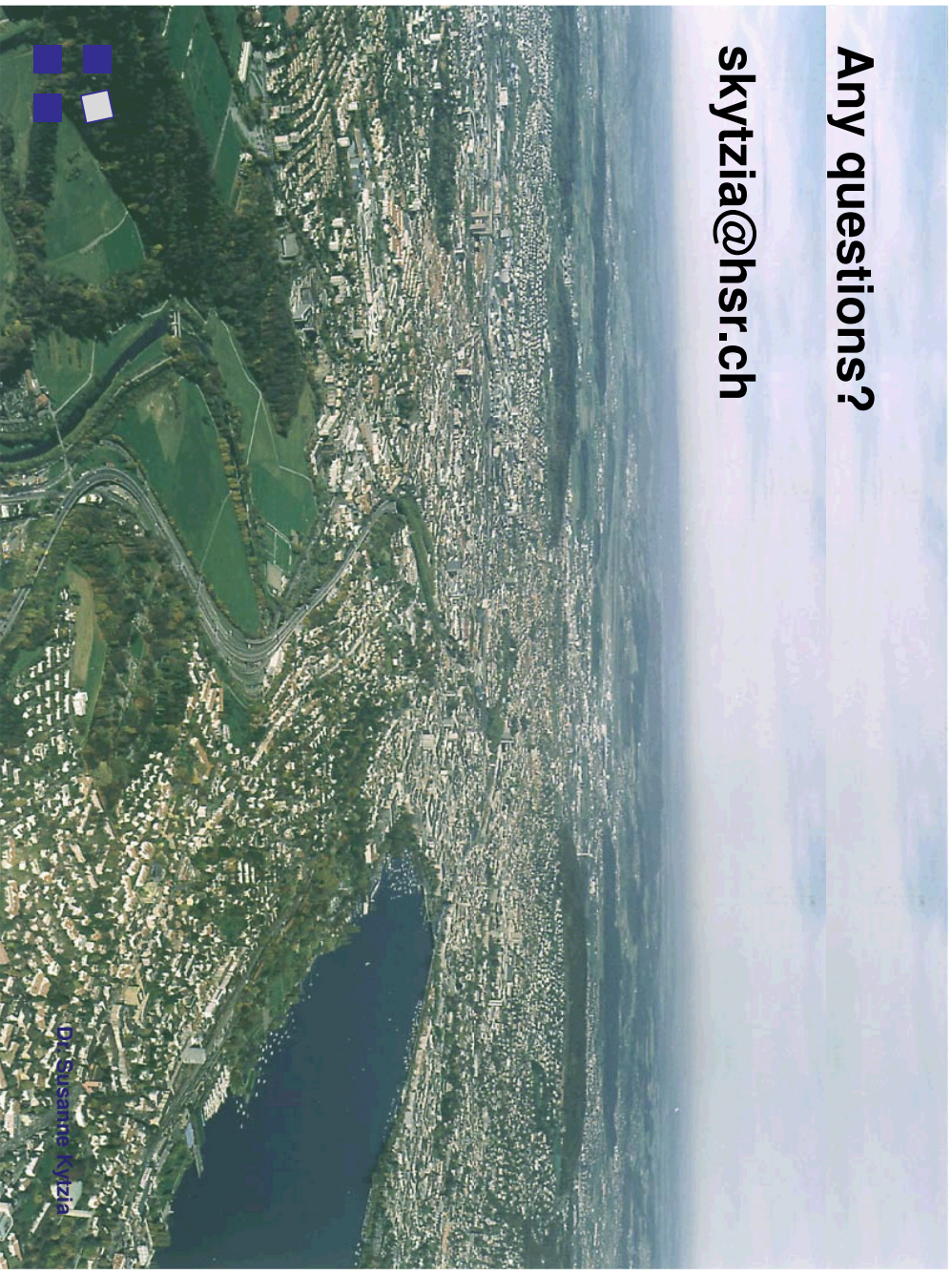
Alle Flüsse in kg/cap. a

Example taken from Wittmer, (2006), Kupfer im regionalen Ressourcen-haushalt, Diss. ETHZ 2006



Any questions?

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Dr. Susanne Kyzla

