Monitoring the use of wood in the German bioeconomy and its global footprint

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SW4SW workshop
´Wood products in a
sustainable bioeconomy´

FAO

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Rome

Overview

- The SYMOBIO project

- The footprints of the bioeconomy

- The primary timber footprint of Germany

- Aspects for assessing sustainability of wood consumption

Monitoring and Modelling the German Bioeconomy

- The **SYM****BIO** project

- Coordinated by CESR in Kassel with eight partners

- 3/2017 – 2/2020, partly extended to 8/2020

- Last status conference 9/2019

- Develops scientific basis for regular monitoring

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SYM BIO

- Agricultural land footprint
- Forestry wood footprint
- Water footprint
- Greenhouse gas footprint

- Dietary patterns and food waste
- Energy and material use
- Circular economy and cascades
- New technologies

How to quantify, model and assess the performance of the BE regarding sustainability?

How could key drivers of the BE develop in the future?

How is the performance of the BE developing over time?

- Socio-economic indicators (e.g., contribution of BE to GDP, Employment in BE, biomass prices)

- Past and future trends
- Counterfactual modelling
- Global impacts of German BE

Environmental footprints

Development of key drivers

Integrated modelling (macro level)

Socio-economic performance

Multi-scale cross sectoral modelling

Remote sensing

Key criteria and indicators

Learning and smart monitoring system

Systemic monitoring of the bioeconomy

Web tools

Framework expectations

Preliminary studies

Crowd sourcing

What are the aspects, criteria and indicators to be considered when monitoring the bioeconomy?

How could a regular monitoring be provided?

Evolution of certification

Certification and LCA (micro level)

LCA within the bioeconomy

- Remote sensing case studies for Germany and regions in South America and South East Asia
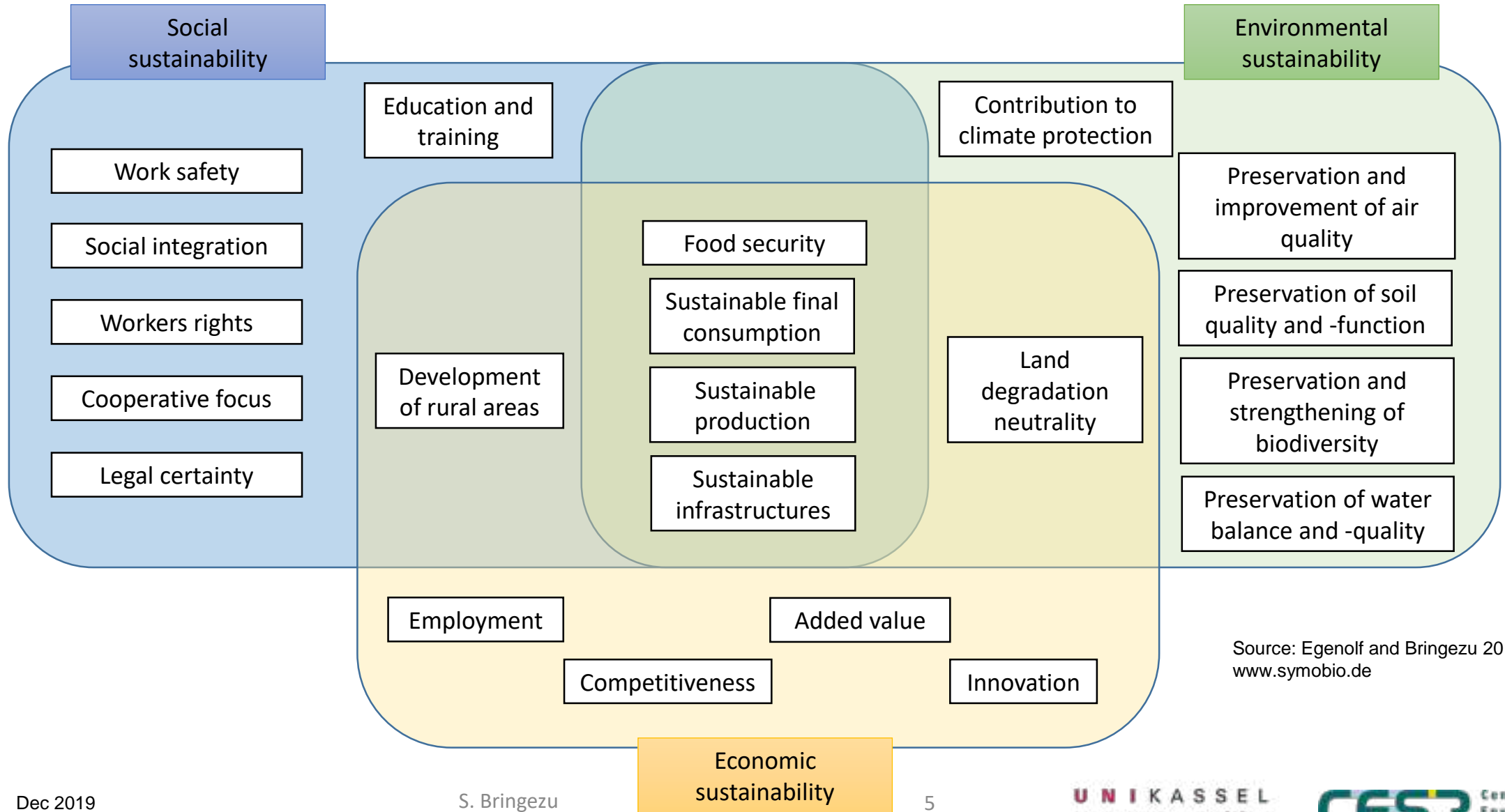- Crowdsourcing of data
- Web-based data exploration tool

- Expectations from related strategies/SDGs
- Regulatory framework
- Stakeholder expectations
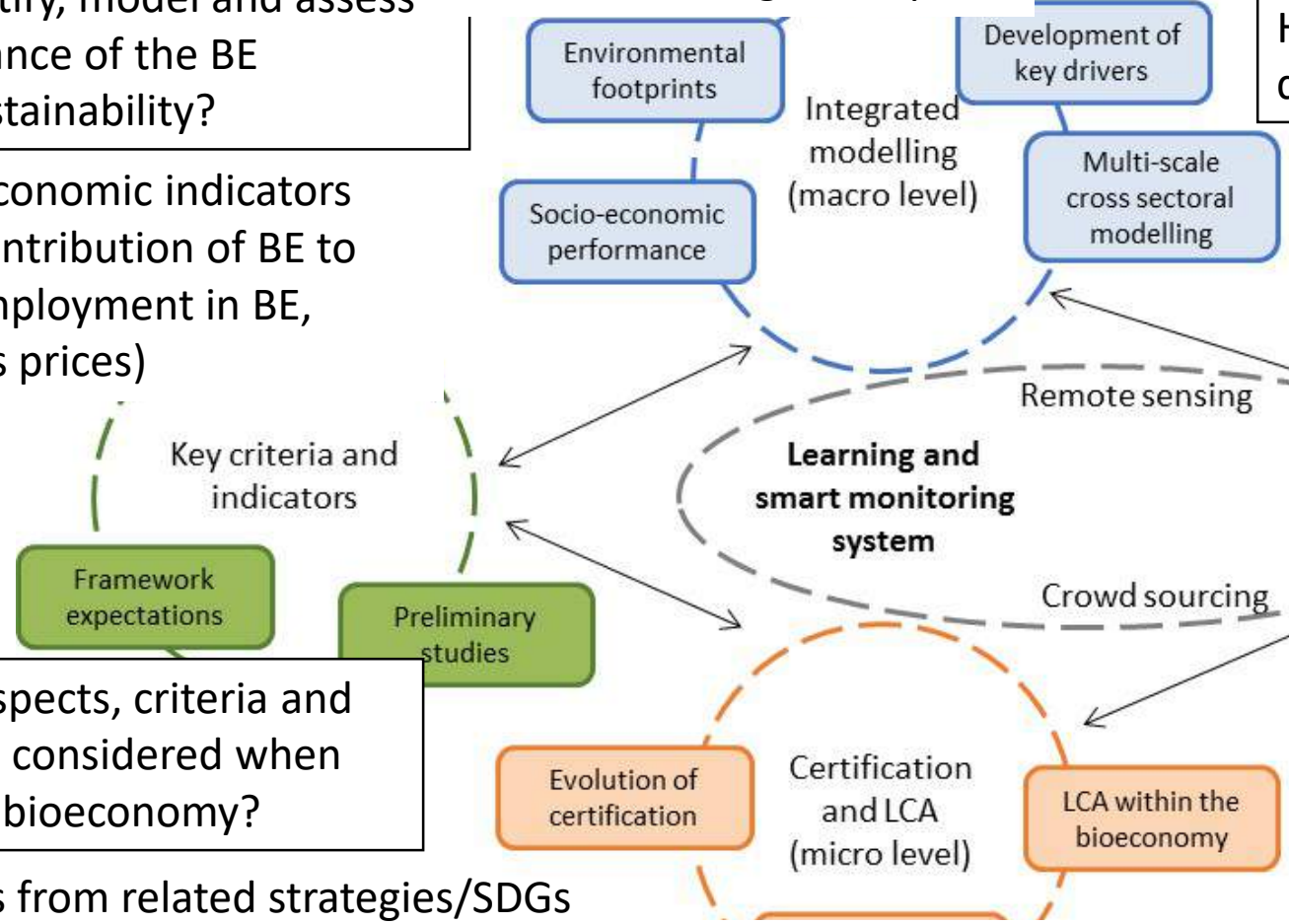
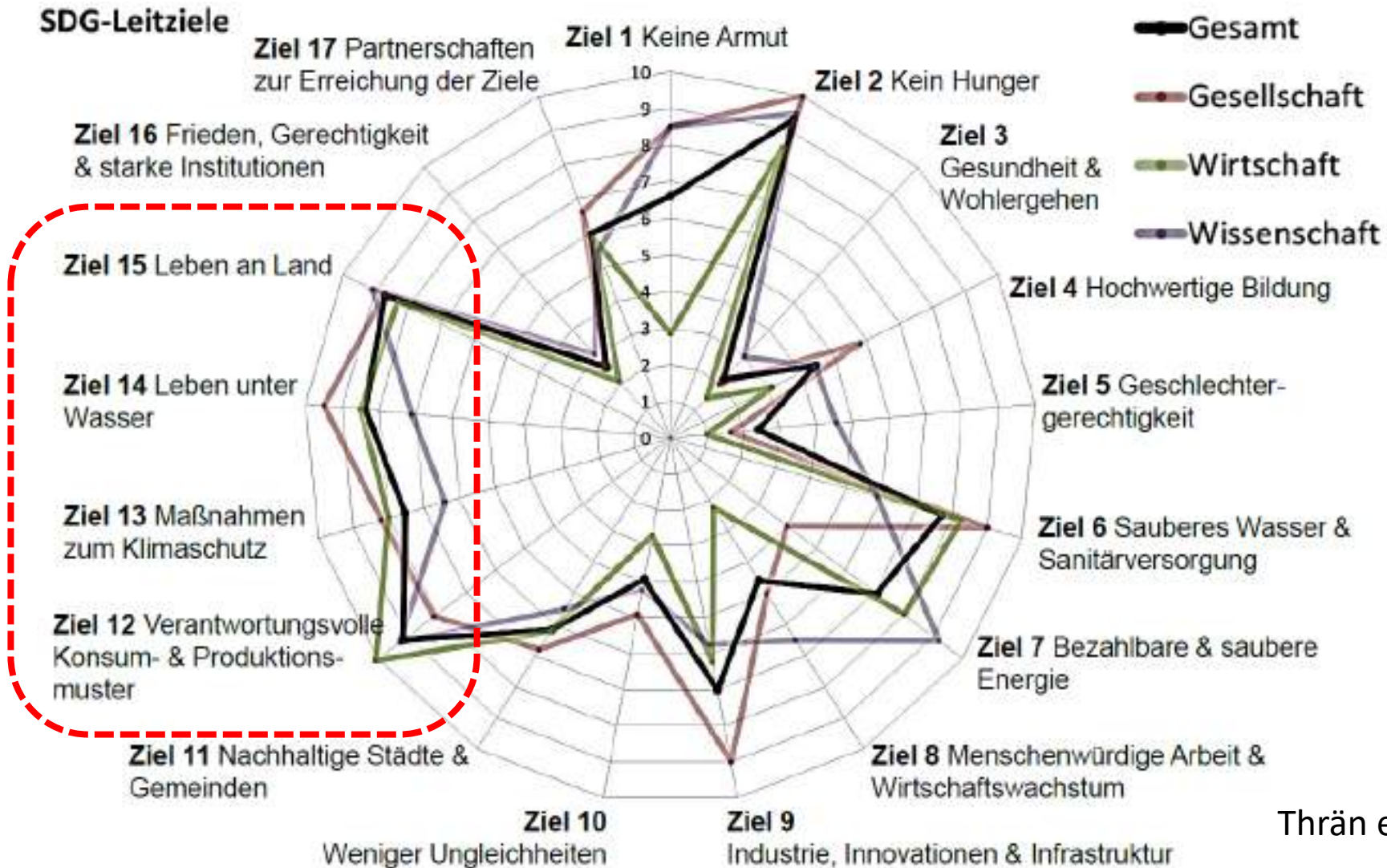- Certification of BE processes and products
- Potential of LCA in BE monitoring

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Key objectives of the bioeconomy

Social sustainability

Education and training

Work safety

Social integration

Workers rights

Cooperative focus

Legal certainty

Development of rural areas

Food security

Sustainable final consumption

Sustainable production

Sustainable infrastructures

Contribution to climate protection

Environmental sustainability

Preservation and improvement of air quality

Preservation of soil quality and -function

Land degradation neutrality

Preservation and strengthening of biodiversity

Preservation of water balance and -quality

Employment

Added value

Competitiveness

Innovation

Economic sustainability

Source: Egenolf and Bringezu 2018, www.symobio.de

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Key drivers: Production, Consumption, Infrastructures
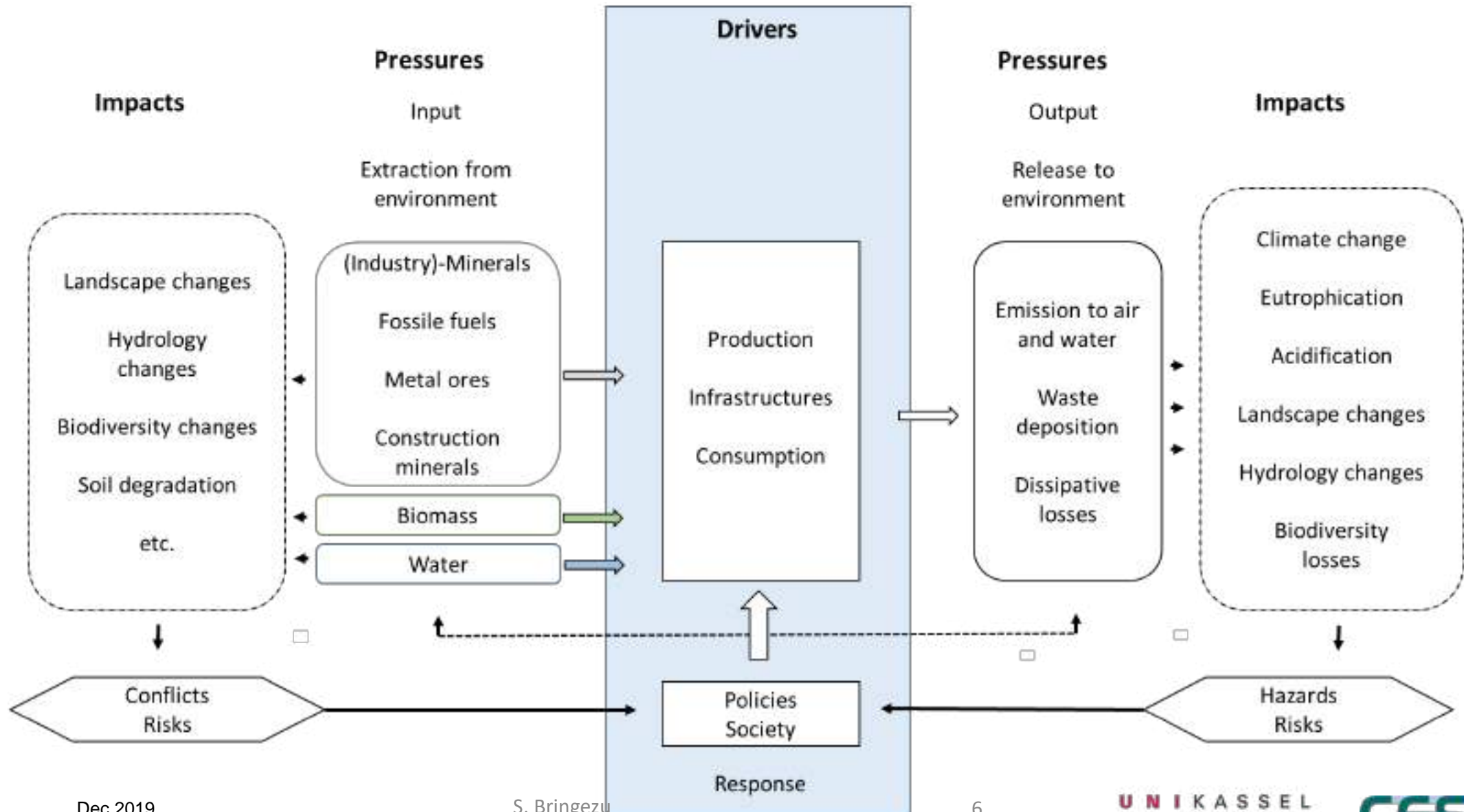
Source: after Bringezu 2015

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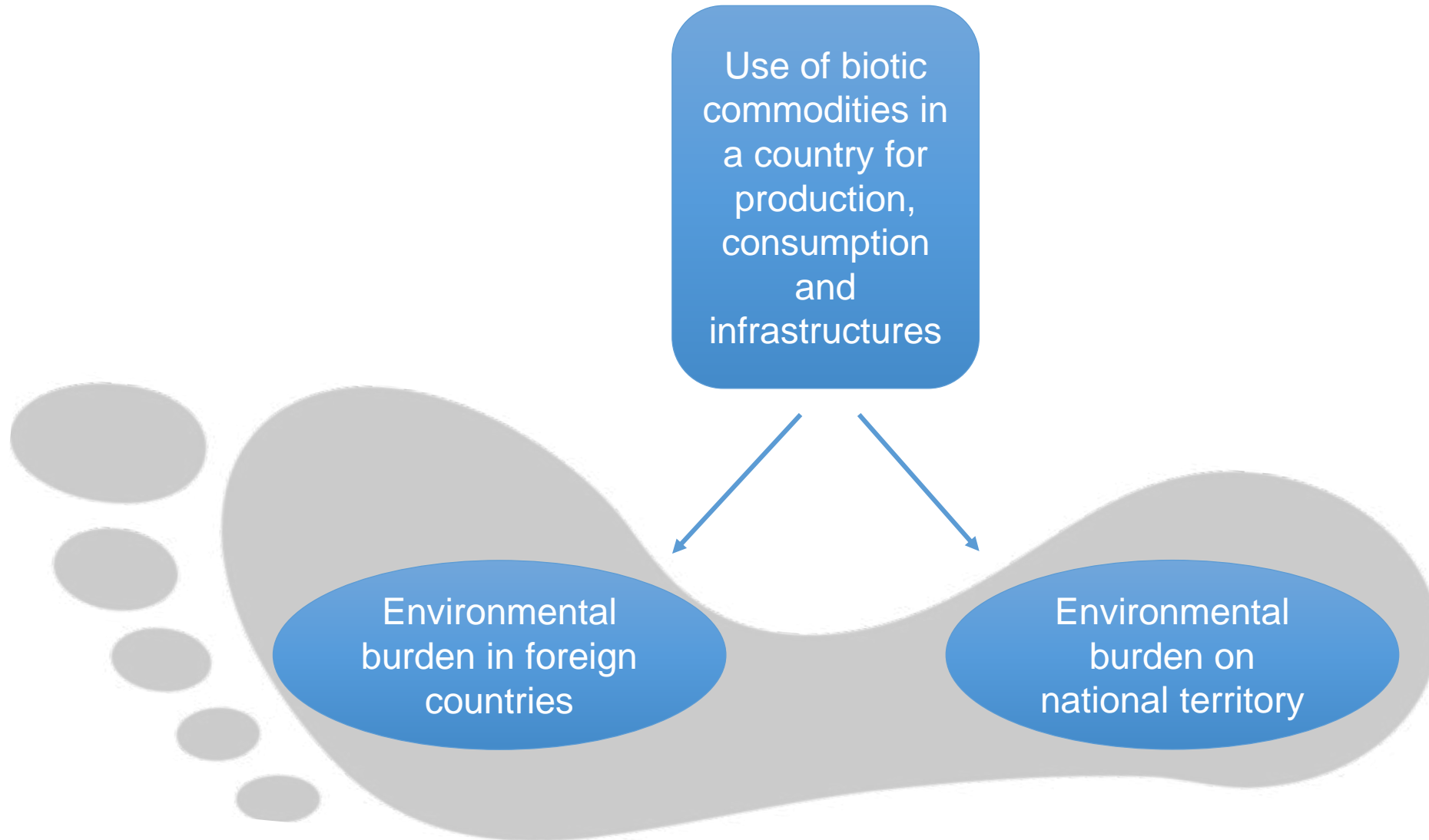
→ Footprints of final consumption regarded as priority by German stakeholders
- Land
- Water
- Global Warming

Thrän et al.

Use of biotic commodities in a country for production, consumption and infrastructures

Environmental burden in foreign countries

Environmental burden on national territory

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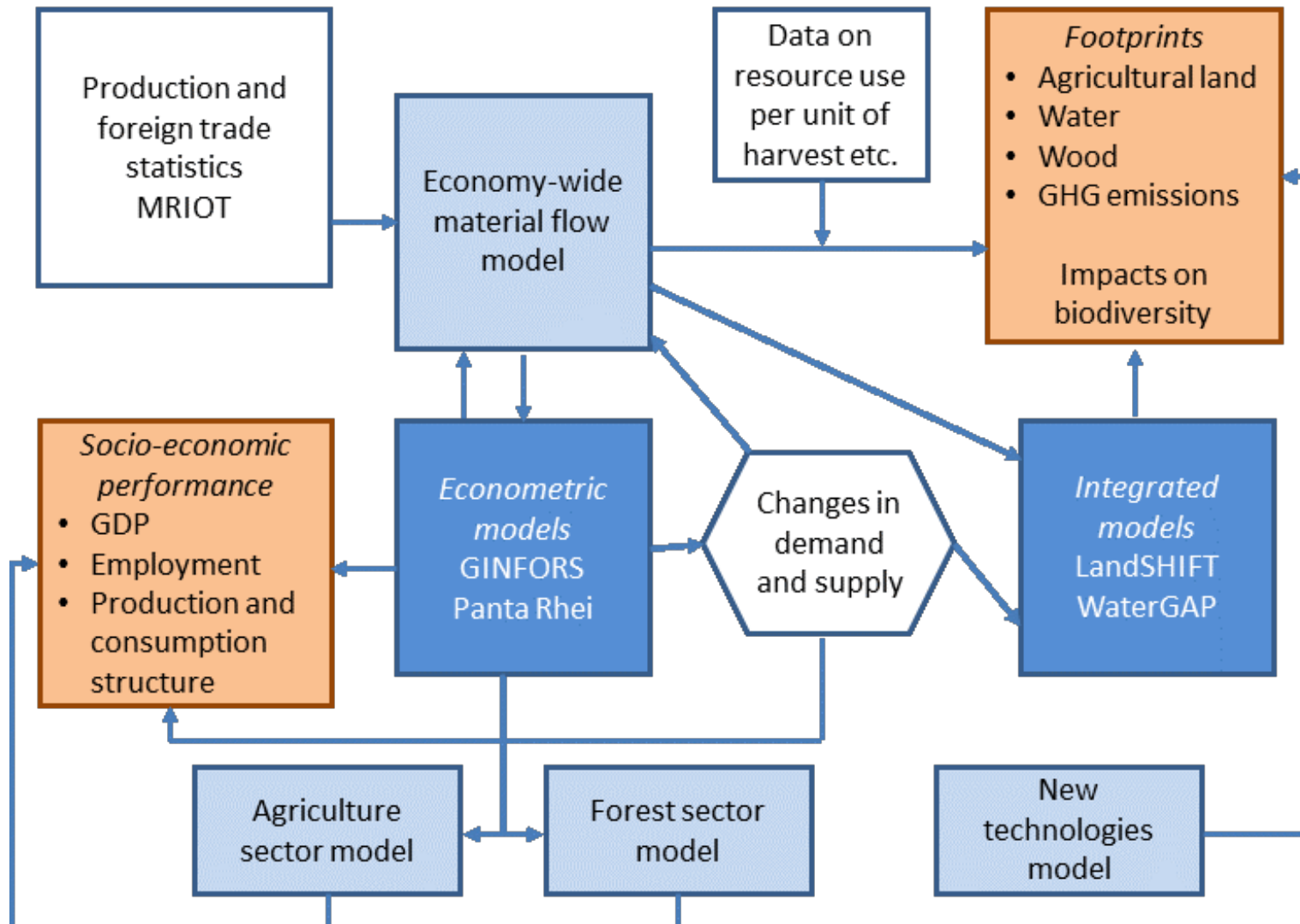
Agriculture FP

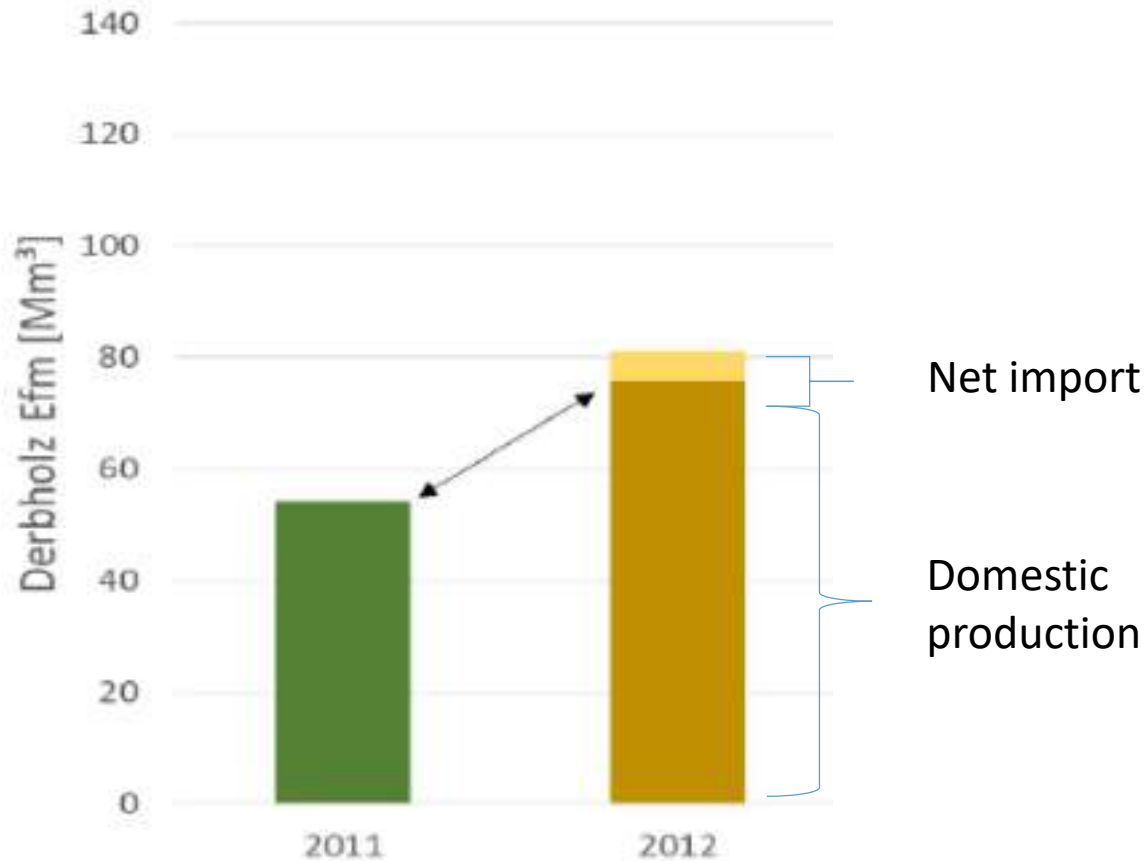Forest FP

Water FP

Material FP

GHG FP

EE-MRIO EXIOBASE 3.4

- Global data and model
- 1995-2011
- 49 countries and regions
- 200 production sectors
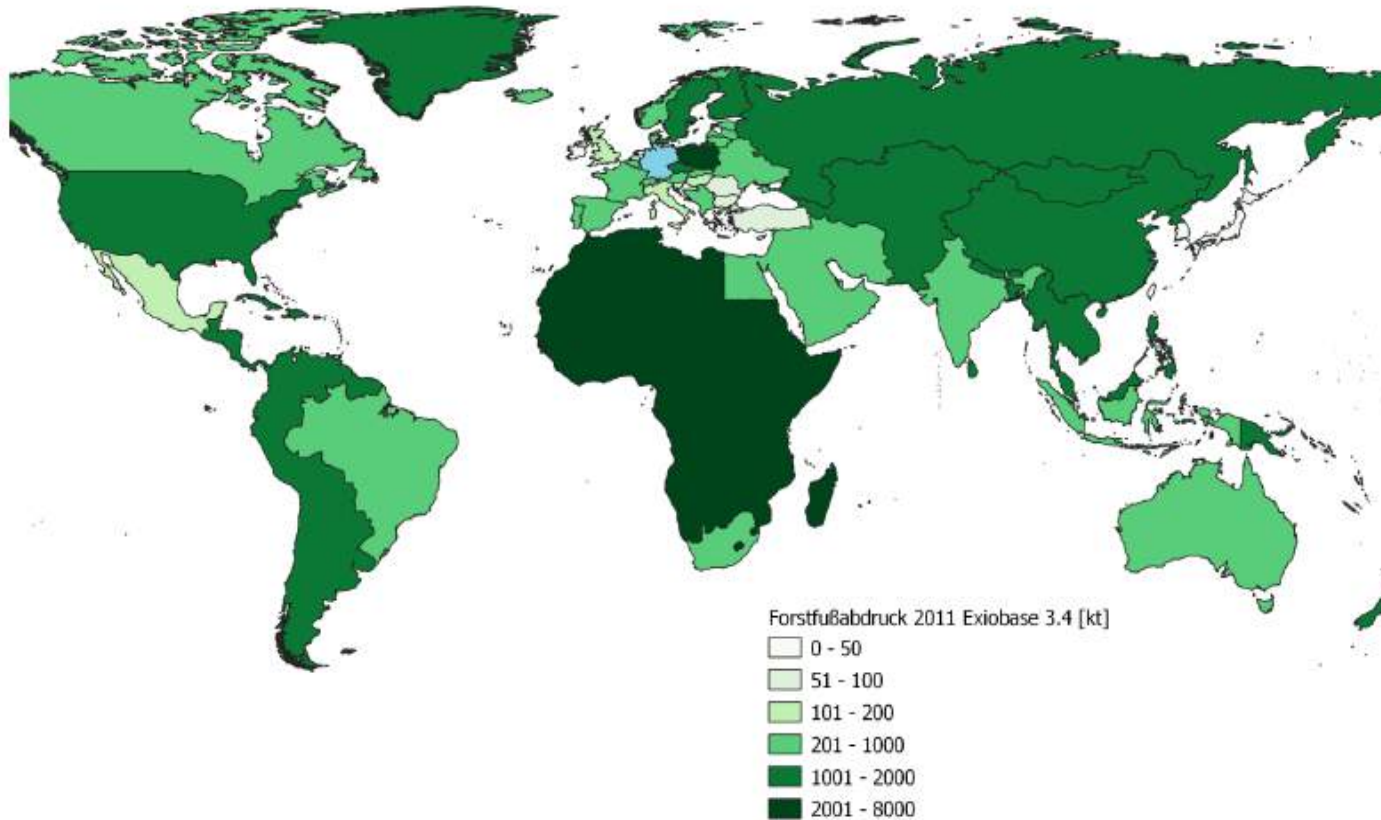- Details on material flows, emissions etc.
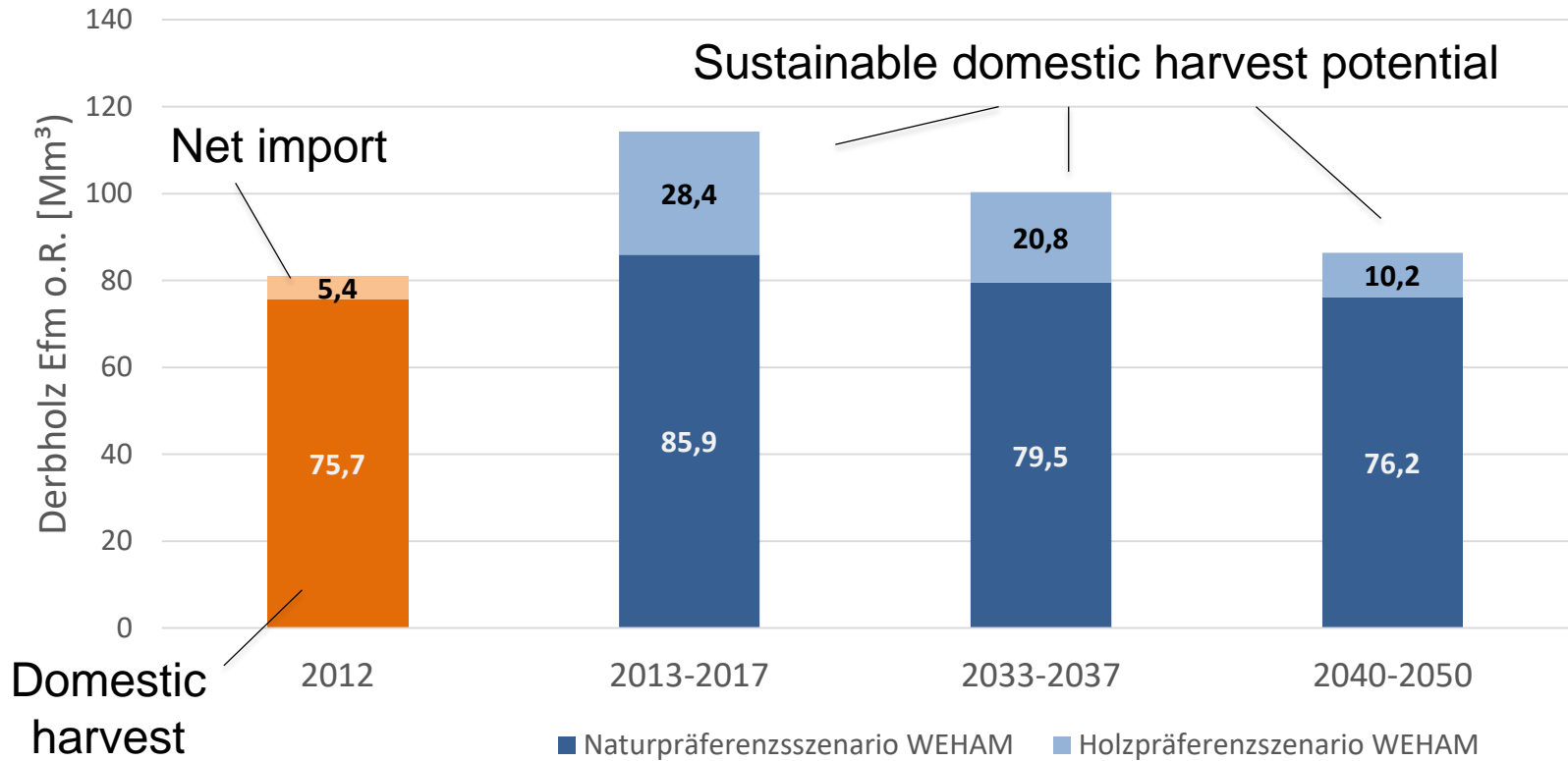
SYM BIO

Net import

Domestic production

- Timber harvest larger than reported by official statistics (submitted to FAO)

- Timber footprint exceeds domestic production
  → Germany is a net importer of primary wood

Statistical data, DESTATIS, FAO; EXIOBASE 3.4

Federal Forest Inventory 3 + foreign net trade

S. Bringezu

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German Timber Footprint

Forstfußabdruck in [kt] (Regionsauflösung Exiobase 3.4)

Forstfußabdruck 2011 Exiobase 3.4 [kt]

- 0 - 50
- 51 - 100
- 101 - 200
- 201 - 1000
- 1001 - 2000
- 2001 - 8000

Vergleich Derbholzkonsum vs. Derbholzaufkommen

Net import

Sustainable domestic harvest potential

Domestic harvest

Derbholz Efm o.R. [Mm³]

2012	2013-2017	2033-2037	2040-2050
5,4	28,4	20,8	10,2
75,7	85,9	79,5	76,2

■ Naturpräferenzsszenario WEHAM ■ Holzpräferenzsszenario WEHAM

- Limited potential for inceased harvest on own territory
- Uncertainties by reduced productivity due to climate change **not yet** considered

→ Increased use of wood only possible by enhanced recycling and cascading or growing imports

German forests increasingly damaged

Two dry summers in sequence

Photo S. Bringezu

Jährliche Absterberate (stehende Bäume), alle Baumarten, alle Alter in %
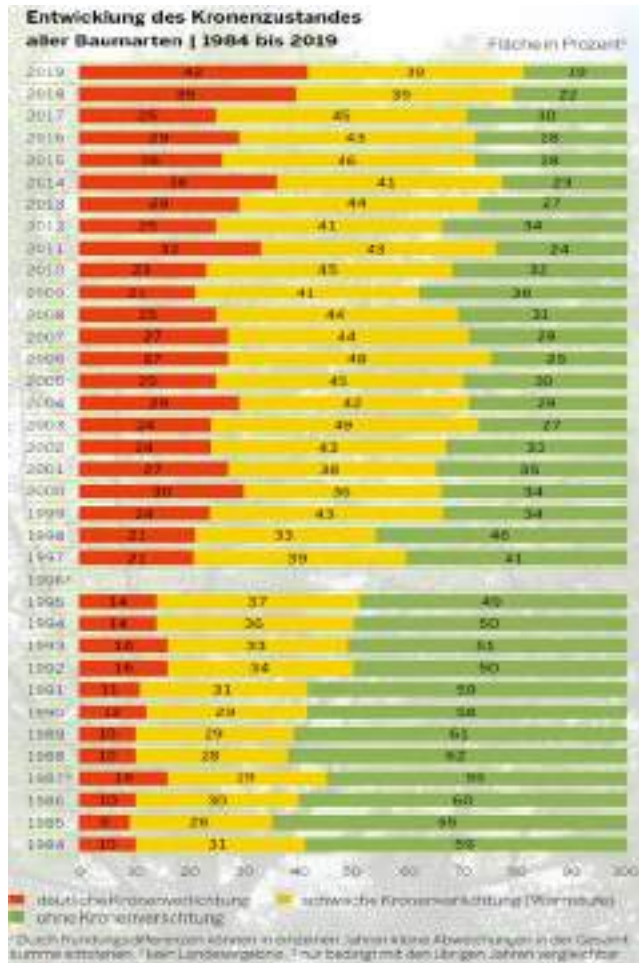
www.nw-fva.de

www.url.nrw/wzb2019

Northrhine-Westphalia

Hesse

- Mortality of spruce and other species increased

- Long-term productivity of forests at risk to due climate change induced weather extremes

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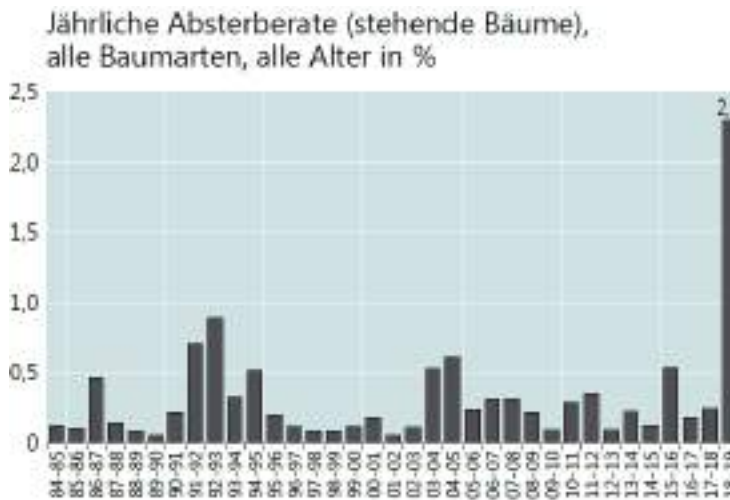
Recycling and cascading of wood already well developed in Germany

Wood use in m³(s) in Germany 2015	Processed volume	Primary input volume	Residue input volume	Recycling input volume	Secondary input volume	Secondary input rate in %
Sawnwood	36,0	36,0	0,0	0,0	0,0	0,0
Panel	13,6	5,7	6,1	1,9	7,9	58,2
Primary pulp	10,0	6,2	3,8	0,0	3,8	38,3
Secondary pulp	43,3	0,0	0,0	43,3	43,3	100,0
Material use	*103,0*	*47,9*	*9,9*	*45,2*	*55,1*	*53,5*
Pellet	4,3	0,2	4,1	0,0	4,1	94,7
Biomass powerplants >1MW	22,1	4,7	6,3	11,1	17,4	78,6
Biomass powerplants <1MW	6,9	4,3	2,3	0,2	2,6	37,0
Households	23,8	21,7	0,8	1,3	2,1	8,8
Energy use	*57,1*	*31,0*	*13,5*	*12,6*	*26,1*	*45,7*
Total	160,1	78,9	23,4	57,9	81,2	50,7

Mantau et al. to be published

# Earlier results: Forest footprint of EU consumption

- Consumption of timber based products up to 2010 above global reference for sustainable supply per person but still below EU reference

- Climate and energy policies will increase consumption of primary timber (BAU)

- If BAU is not changed demand will exceed sustainable thresholds
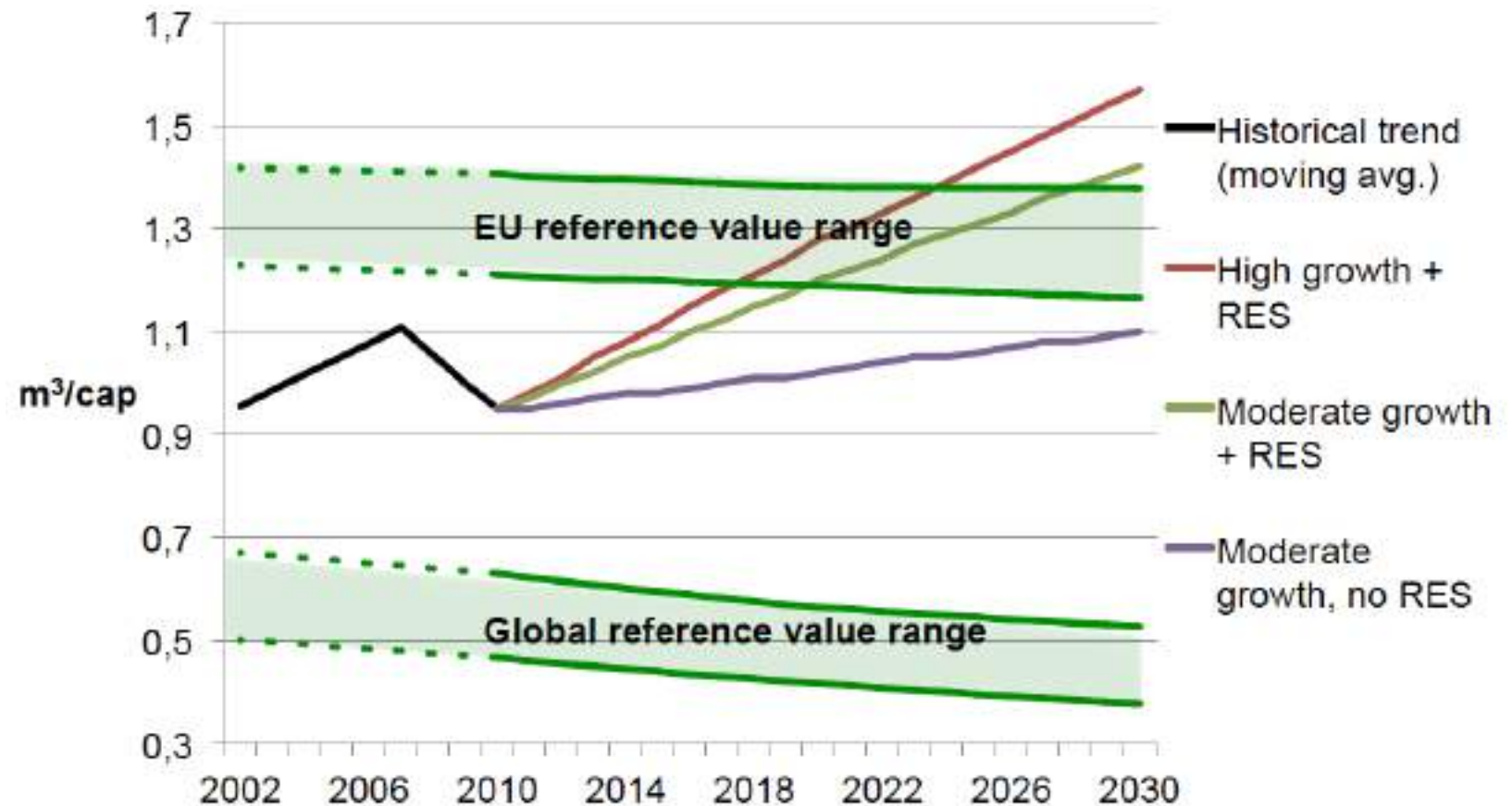
Source: O´Brien and Bringezu (2017a)   doi:10.3390/land6040084

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Earlier results: Reference values for sustainable timber supply for 2010
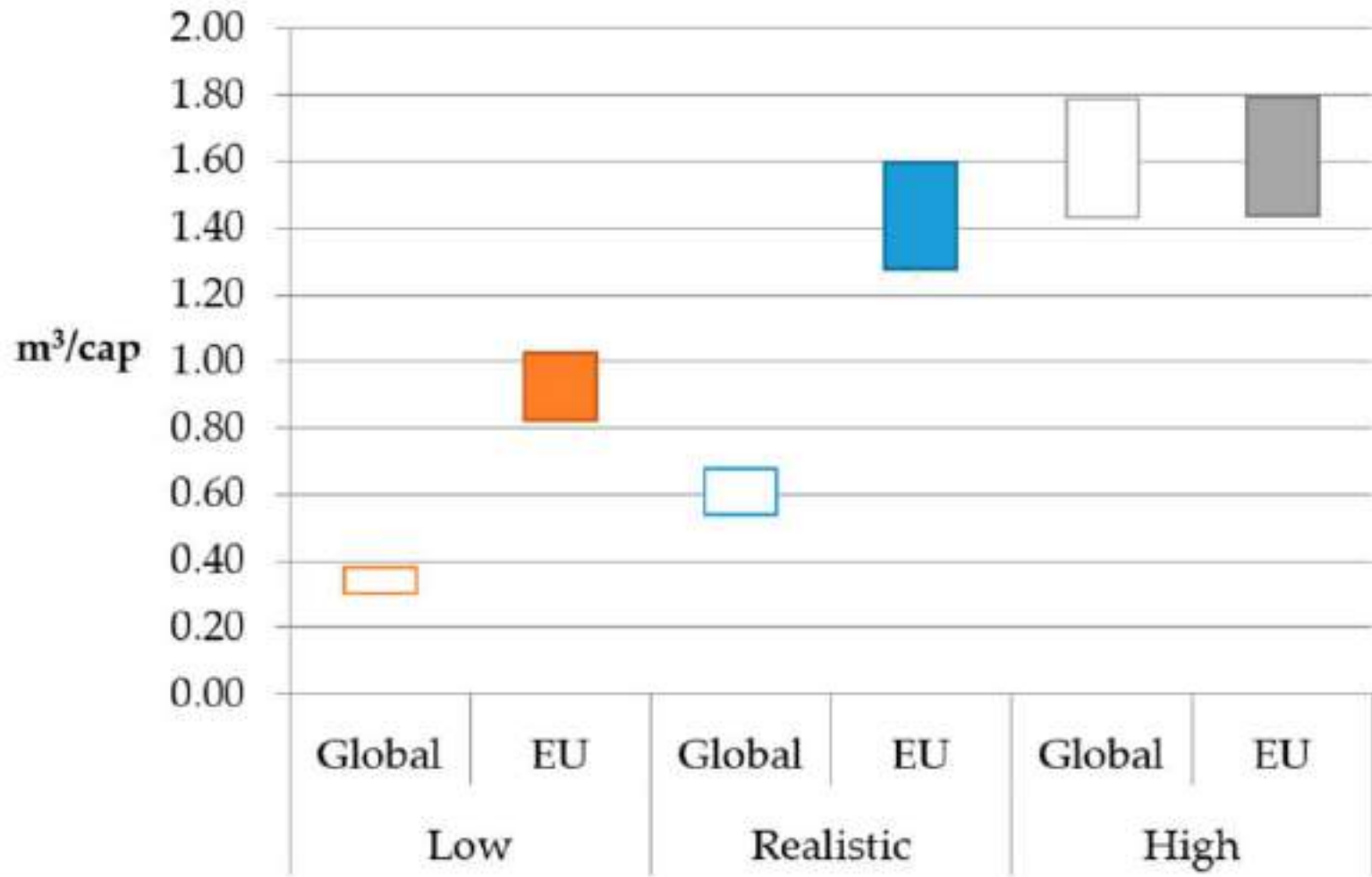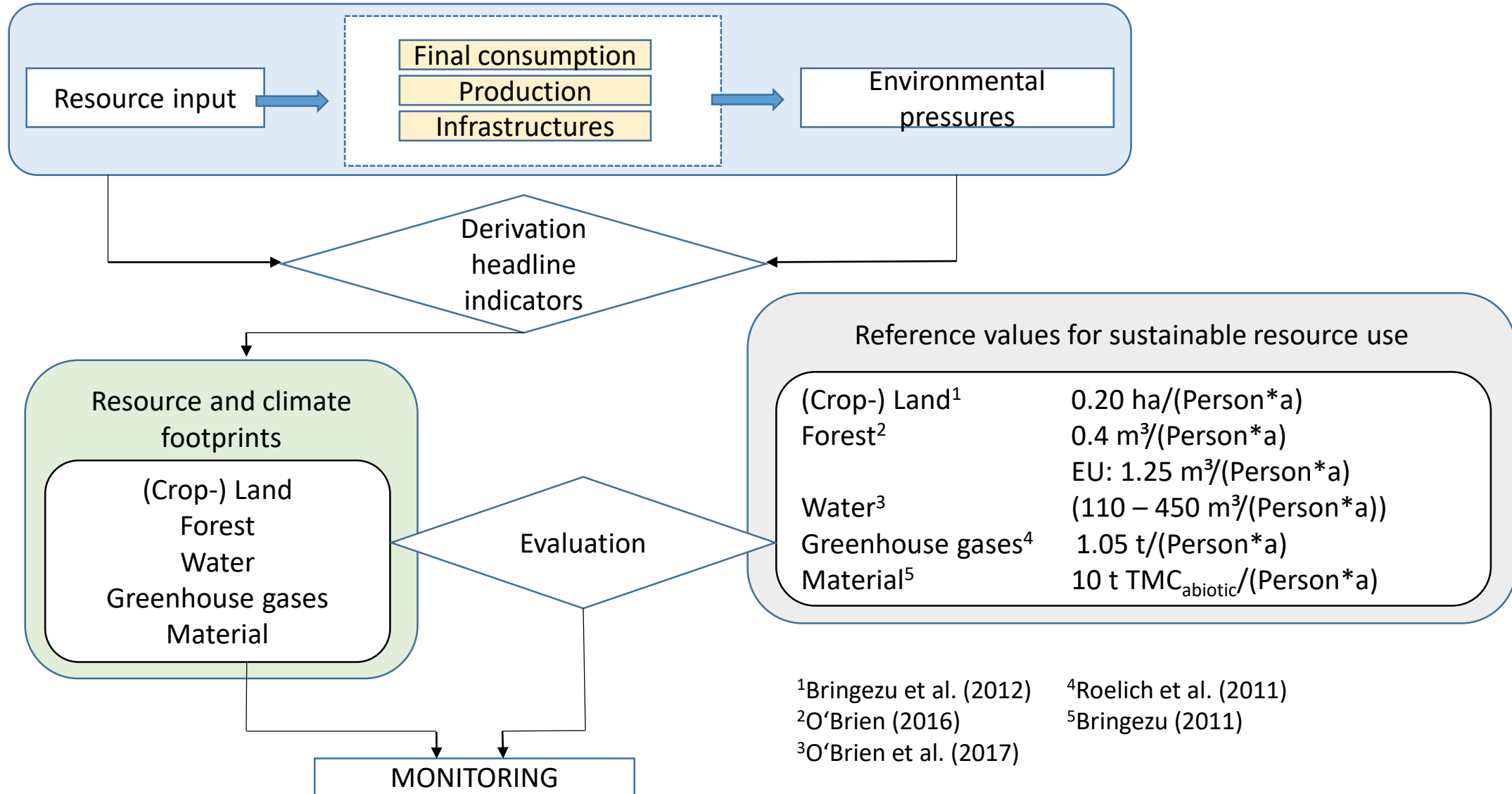

Range depicts use of 80-100% of NAI in the regions

Source: O´Brien and Bringezu (2017b) doi:10.3390/su9050812

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Earlier results: Available primary timber supply
Low, realistic and high potential – basic assumptions

Forest Area Available for Wood Supply (FAWS)		Productivity: Net Annual Increment (NAI)	
Definition	Key Sources	Definition	Key Sources
Forest where any legal, economic (e.g., accessibility), or specific environmental restrictions do not have a significant impact on the supply of wood	[14,15]	The average annual volume over the given reference period of gross increment less that of natural losses on all trees to a minimum diameter at breast height of 0 cm	[14]
Forest theoretically available for wood supply, which comprises all forest area minus forest in protected areas [1]	[16]	Highest potential estimate of NAI	
Forest realistically available for wood supply, which comprises the best estimate based on literature sources and available data	National sources [2] and [14–17,20–23]	Best potential estimate of NAI. 'Fast-growing plantations' estimated based on MAI and 'natural/semi-natural forest area' on NAI	[14,15,17–20]
Minimum forest available for wood supply, which comprises a modest estimate based on literature sources and available data	Lowest minimum estimate from above sources (in case >2 estimates available) or 25% less than the realistic estimate [3]	Lowest potential NAI estimate	

Source: O´Brien and Bringezu (2017b) doi:10.3390/su9050812

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Reference values for sustainable resource use

(Crop-) Land[1]	0.20 ha/(Person*a)
Forest[2]	0.4 m³/(Person*a)
	EU: 1.25 m³/(Person*a)
Water[3]	(110 − 450 m³/(Person*a))
Greenhouse gases[4]	1.05 t/(Person*a)
Material[5]	10 t TMC$_{abiotic}$/(Person*a)

[1]Bringezu et al. (2012)   [4]Roelich et al. (2011)
[2]O'Brien (2016)   [5]Bringezu (2011)
[3]O'Brien et al. (2017)

doi:10.3390/resources8030140

See also   www.symobio.de

doi:10.3390/su11020443

Source: Egenolf and Bringezu 2018

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Conclusions

- Monitoring of sustainable wood use needs to consider both production and consumption

- Production statistics have significant gaps (more is used than reported)

- Consumption of primary timber by countries can be monitored by Multi-Regional-Input-Output analysis

- In Germany, although forests have been highly productive, higher harvest is limited and expanded use of wood domestically only possible by increased recycling and cascading (which is already well developed)

- **Before boosting demand for timber products the potentials and scenarios for sustainable supply (NAI under climate change conditions) should be determined for every country**

Thank you very much!

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Further Info:

www.cesr.de

www.symobio.de

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