The background of the slide features a complex network diagram. It consists of numerous small, light gray circular nodes connected by thin, light gray lines. The nodes are distributed across the entire slide, with a higher density in the lower right quadrant. The overall effect is that of a web or a molecular structure. A large, dark teal rectangular area is positioned on the right side of the slide, containing the main title and author information in white text.

The Biodiversity Value Increment method for holistic valuation of biodiversity in LCA

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Methodological context

Life Cycle Assessment

- Impact = inventory quantity × characterization factor

___ kg CO₂

Factor 1

___ kg CH₄

Factor 28

___ kg N₂O

Factor 265

___ m²a almond plantation

Factor ___

___ m²a wheat field

Factor ___

___ m²a spruce forest

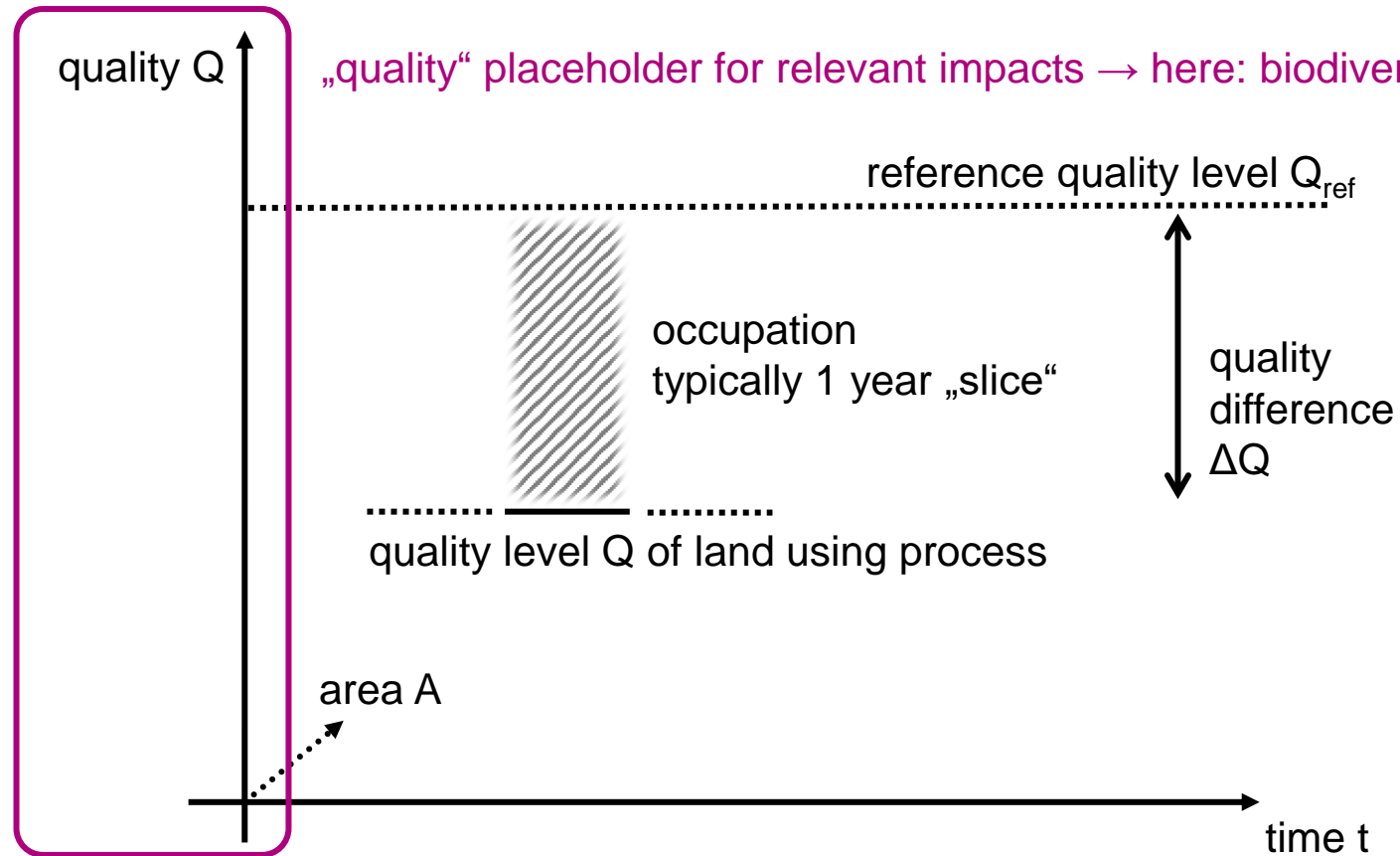
Factor ___

Climate impact

Biodiversity impact

Basic methodology

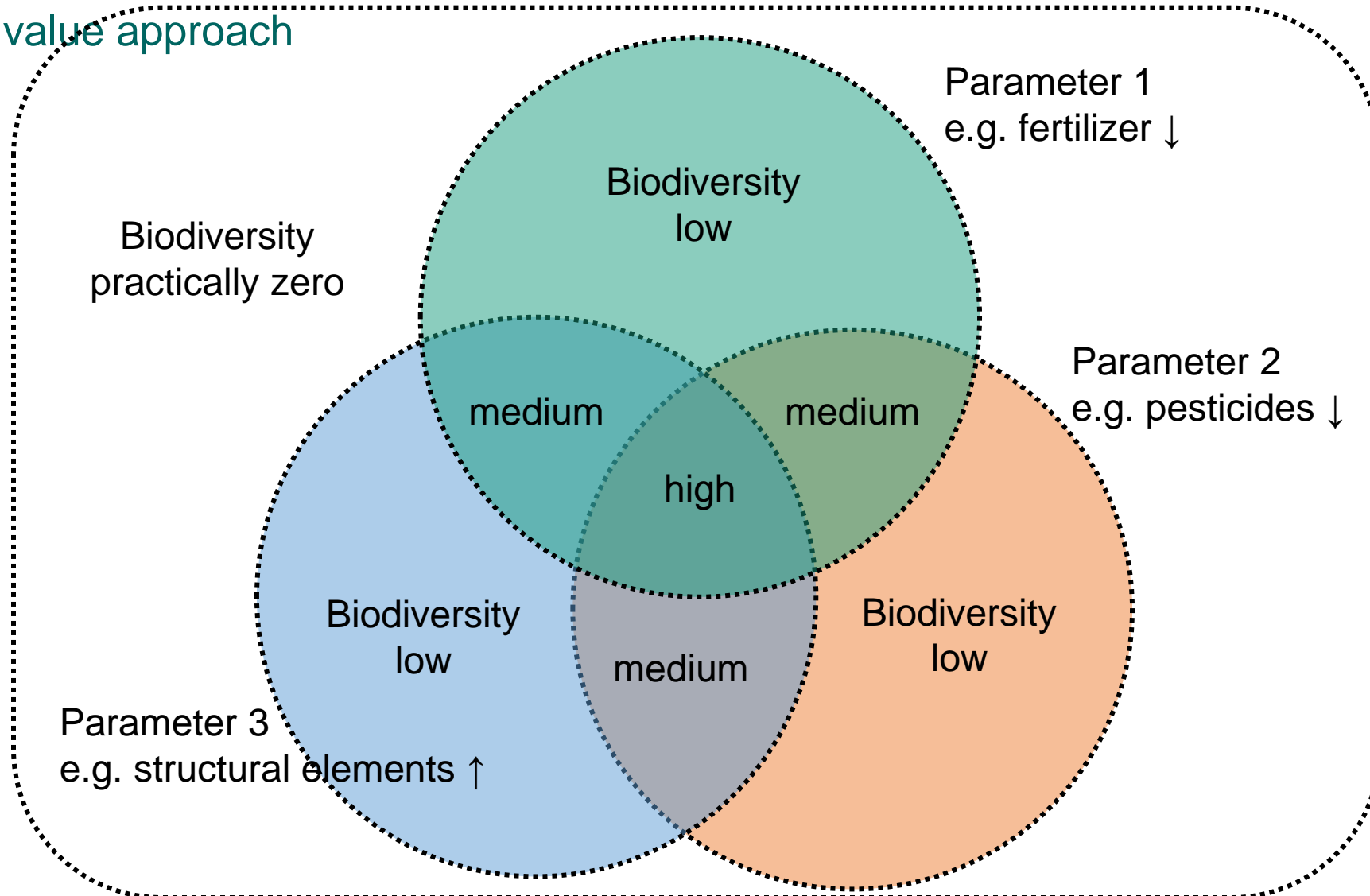
Impact assessment in LCA – land use



- Attention, plus/minus switch!
- higher quality (Q) = better
 - higher difference (ΔQ) = worse

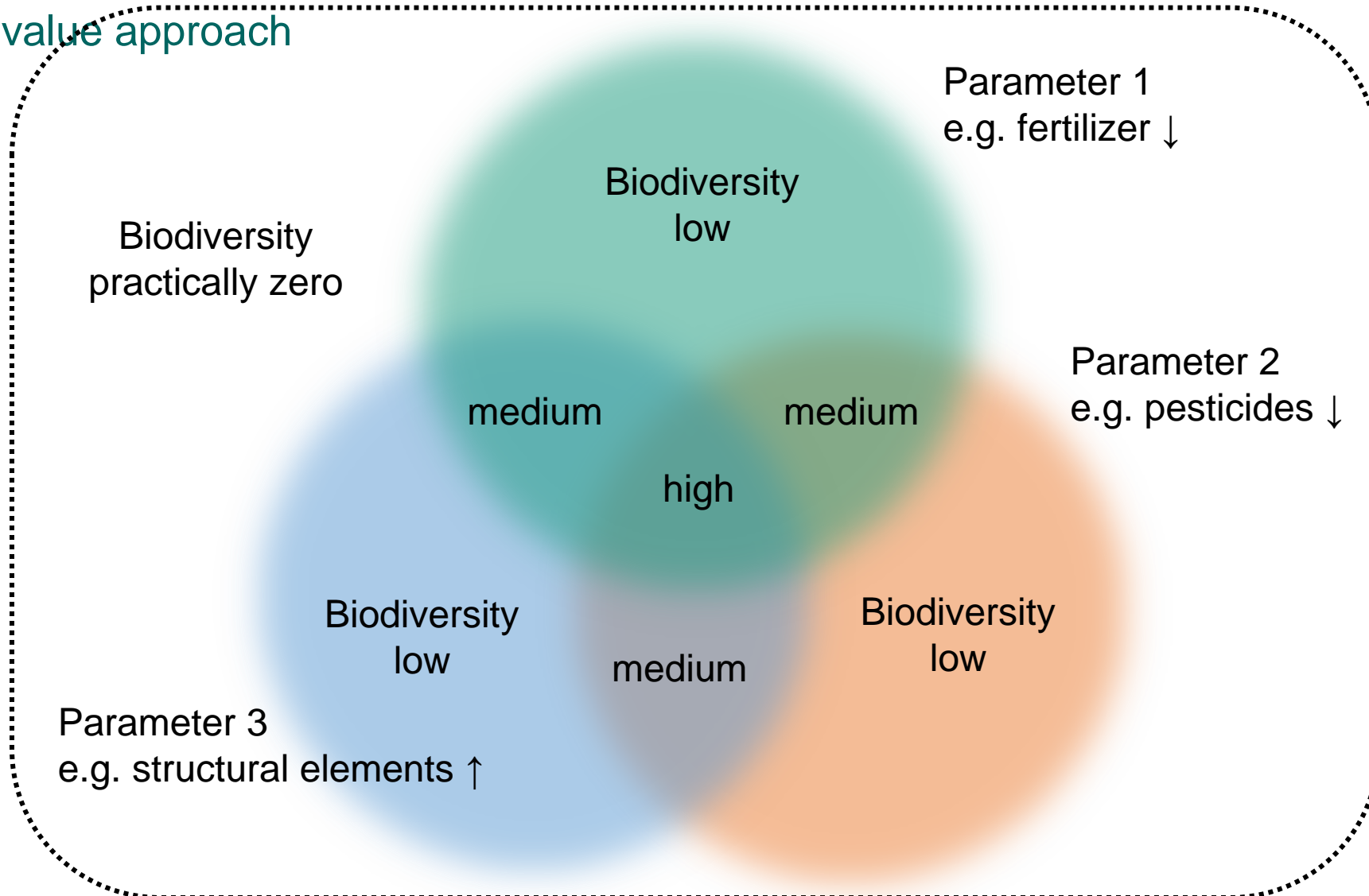
BVI methodology

Biodiversity value approach



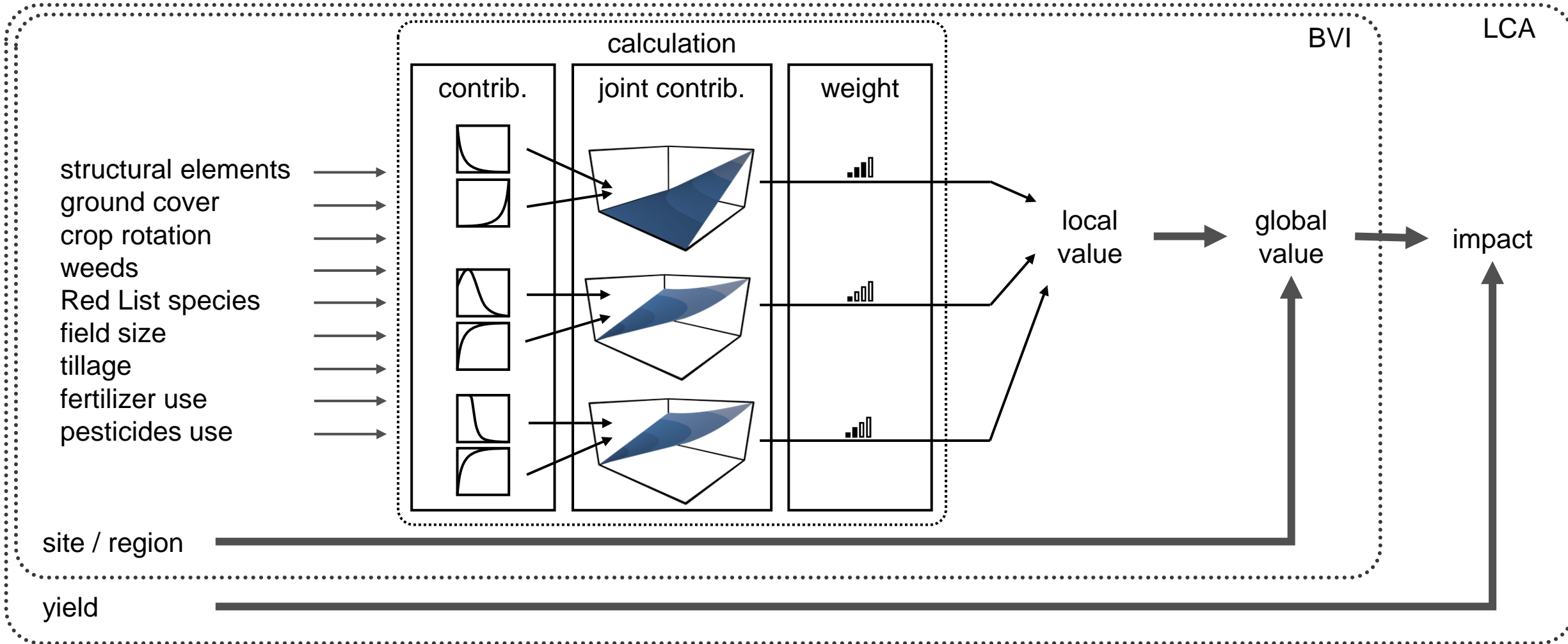
BVI methodology

Biodiversity value approach



BVI methodology

Calculation / information flow within the BVI methodology



BVI methodology

Land use types within the hemeroby concept

The hemeroby class system with indicative allocations of the distribution of different land use types

Hemeroby class	Forest/Forestry	Agriculture	Settlement areas		
I natural	Primary forest, no use				
II	More				
III	to	Grassland, extensive, species-rich			
IV	less natural forest	to intensive management	Arable land, extensive to intensive management	Derelict land	
V	management			Mining areas	
VI	Timber plantations				
VII					Sealed surface

Dashed borders show extreme cases, both positive (raw material extraction areas with high nature value potential) and negative (timber plantations with permanent damage to the self-regulating capacity of ecosystems such as eucalyptus plantations).

Reference: own representation 2021, ifeu, extended from (Fehrenbach et al. 2015)

Fehrenbach et al. (2021)


BVI methodology

Interpretation of results

- Unit of Impact: $BVI * m^2 * a / FU$
- calculated difference of biodiversity value from ideal state [BVI]
- on a known area [m^2] over a known duration [a]
- per known amount of product, i.e. per functional unit (FU)

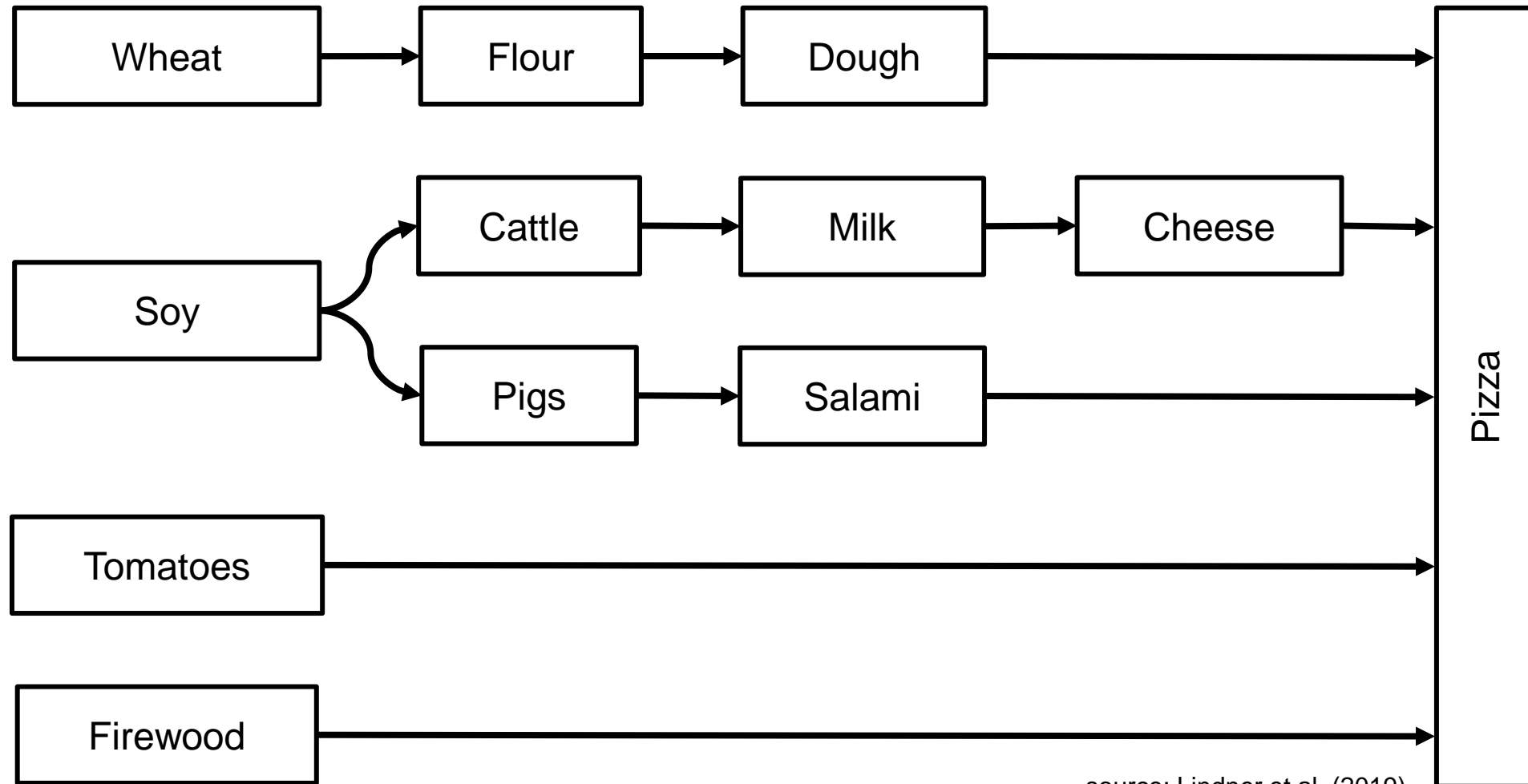
BVI methodology

Interpretation of results

- result of the biodiversity quality calculation:
assigned ecological value of the identified area

 - ↳ normative positing
 - ↳ scientific underpinning
- Value assignment expresses preferences quantitatively.
 - We (society) would rather preserve this area than that one – specifically 1.8 times as much.
- Value assignment produces exchangeability.
 - 1 m² of this area is 1.8 times as valuable as 1 m² of that area.
- Value assignment is abstract, but useful.
 - Analogy: Money – Euros and Cents are no objective values, but practical and give orientation.

Example

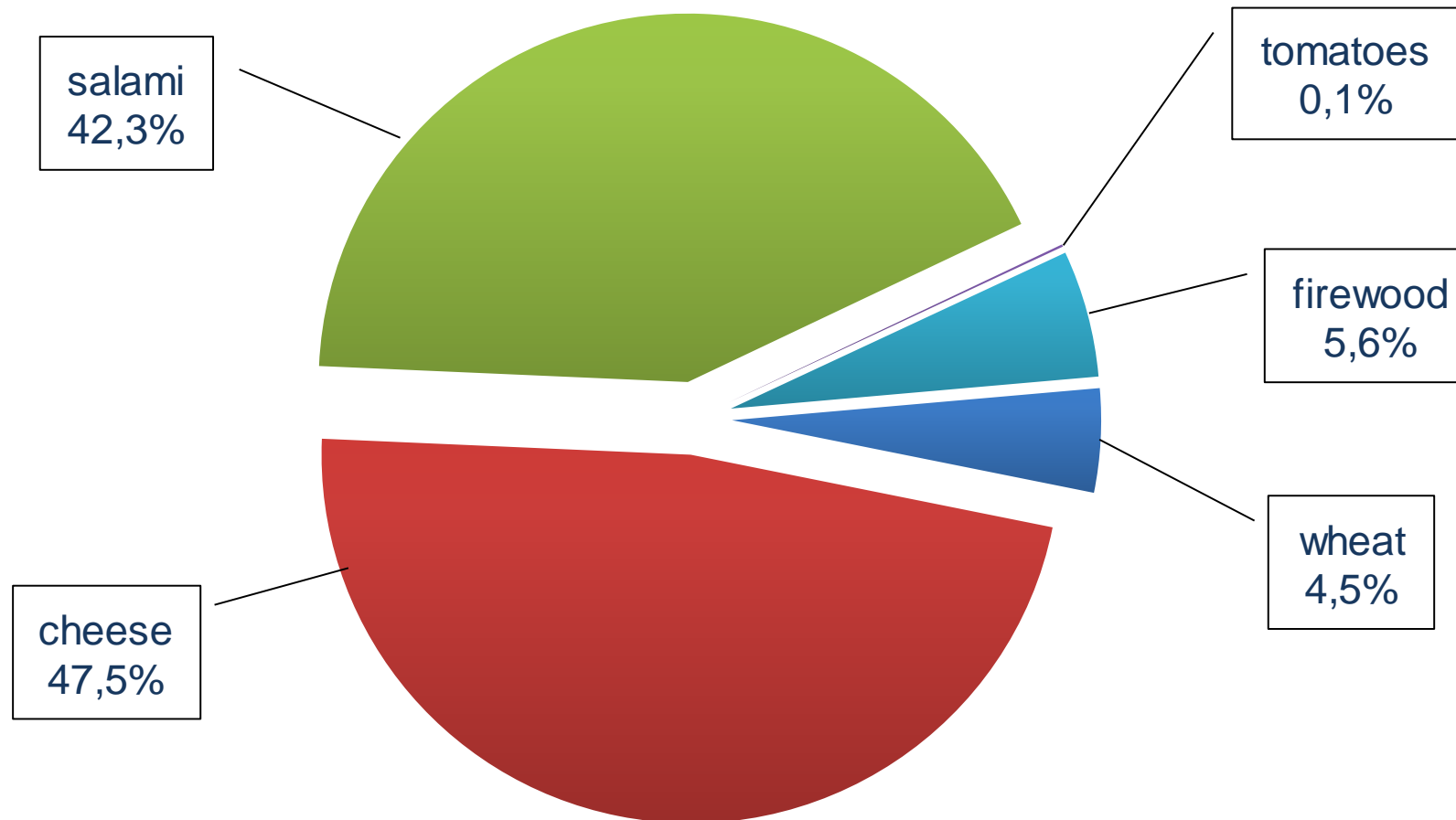
Pizza with cheese and salami, baked in wood-fired oven



source: Lindner et al. (2019)

Example

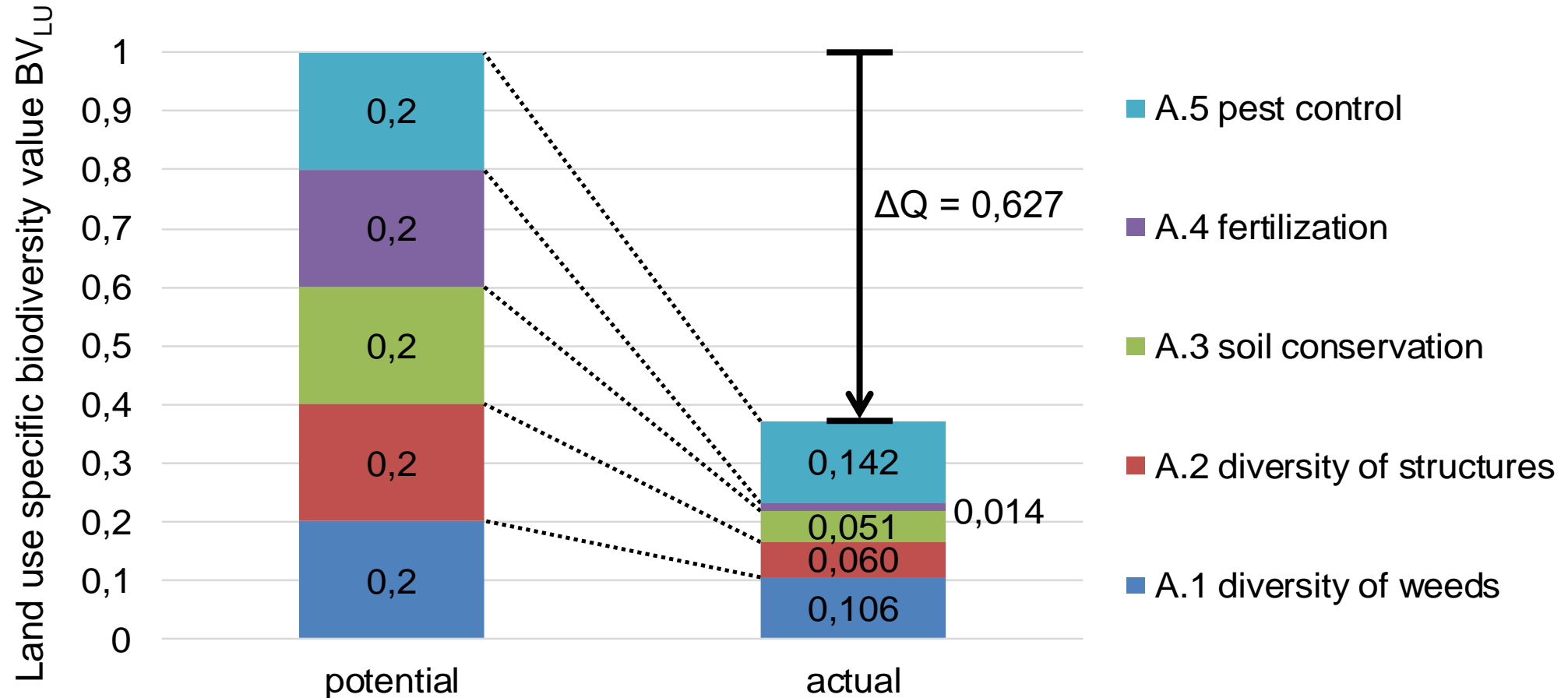
Pizza with cheese and salami, baked in wood-fired oven



source: Lindner et al. (2019)

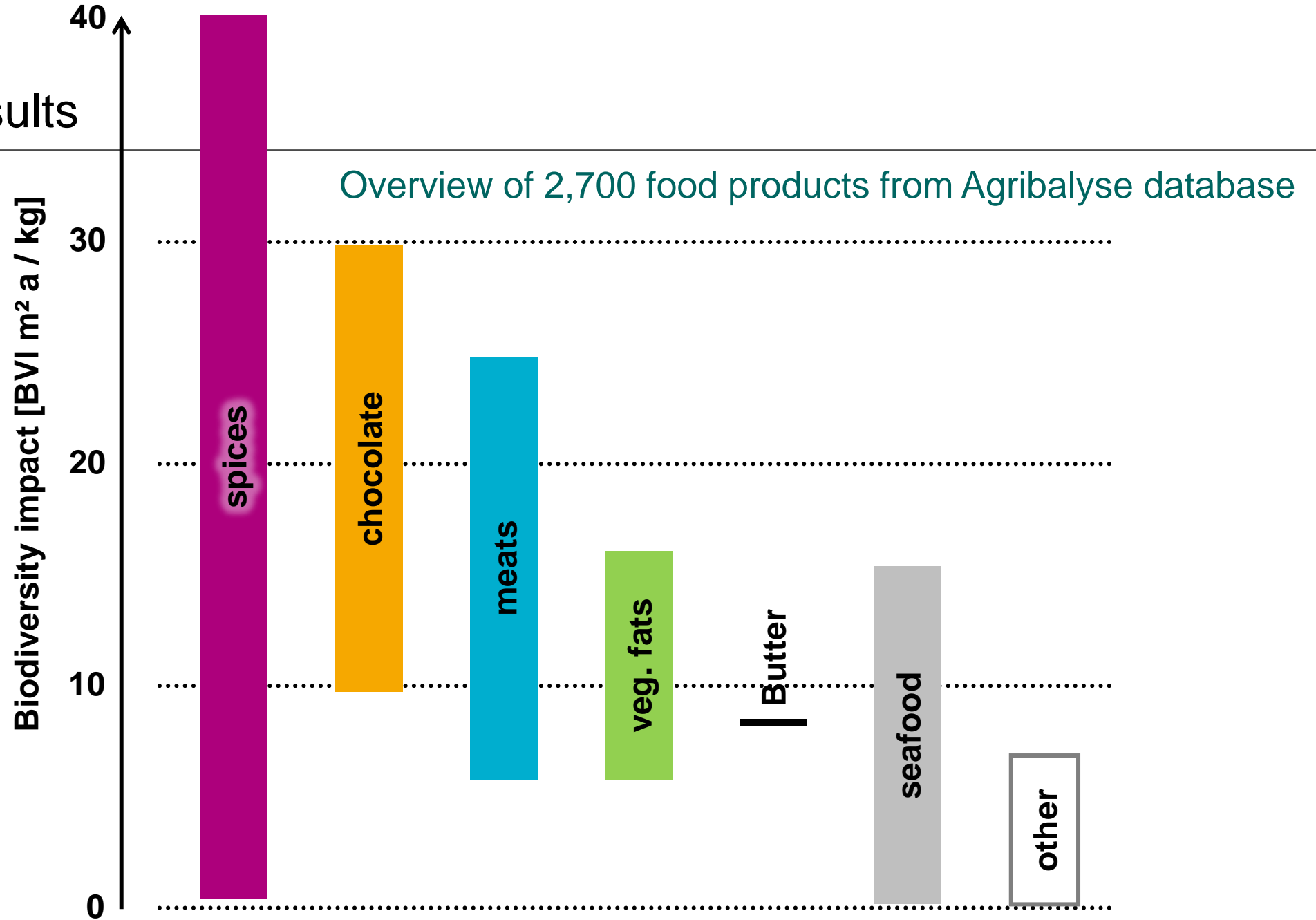
Example

Pizza with cheese and salami, baked in wood-fired oven



source: Lindner et al. (2019)

Example results



Continuity of methodology development

Track record of almost 15 years

- two R&D projects supported by the Fed. Agency for Nature Conservation in the 2010s
→ methodology groundworks
- junior research group supported by private foundation, 2017 – 2021
→ further methodological development
- two industry contracts: biodiversity benchmarking for factory sites, 2018 – 2020
→ then without explicit LCA reference
- various M.Sc. theses and case studies at Bochum Univ. of Appl. Sciences, ca. 2018 – 2023
→ e.g. biodiversity impacts of the top five metals embedded in the VW ID.3
- R&D project supported by Fed. Ministry of Education and Research, focus on foods, 2021 – 2024
→ application in the food industry + further methodological development
- Agribalyse, the French food products LCA database, 2021 – 2022
→ biodiversity impacts of ca. 2,700 food products
- industry contract: implementation of BVI method in own LCA system, 2023 – 2024
→ available for in-house LCA experts now

Thank you for your attention!

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