



TRansition paths to sUstainable legume- based systems in Europe

Dr. Pietro (Pete) Iannetta, Agroecologist

pete.iannetta@hutton.ac.uk

@AgroEcoAtJHI



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TRAnsition paths to sUstainable legume-based systems in Europe (TRUE)

- *An H2020-Sustainable Food Security (SFS), innovation action*
- *24 partner project (€5m)*
- *started 1st April 2017, for 4 years*

www.true-project.eu



TRUE partners, Kick-off Meeting, Edinburgh Scotland UK (April'17)

EU-TRUE has received funding from the European Union

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Technology Centre



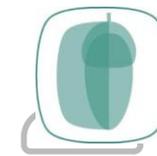
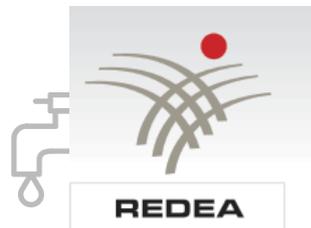
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International trade in reactive nitrogen



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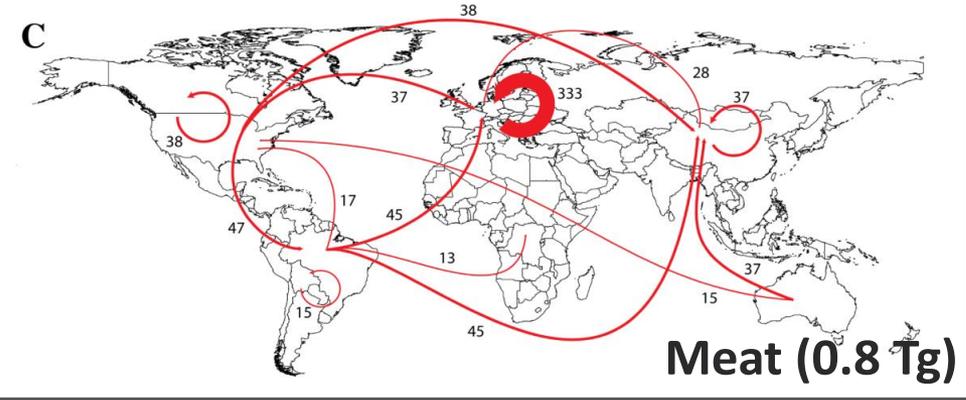
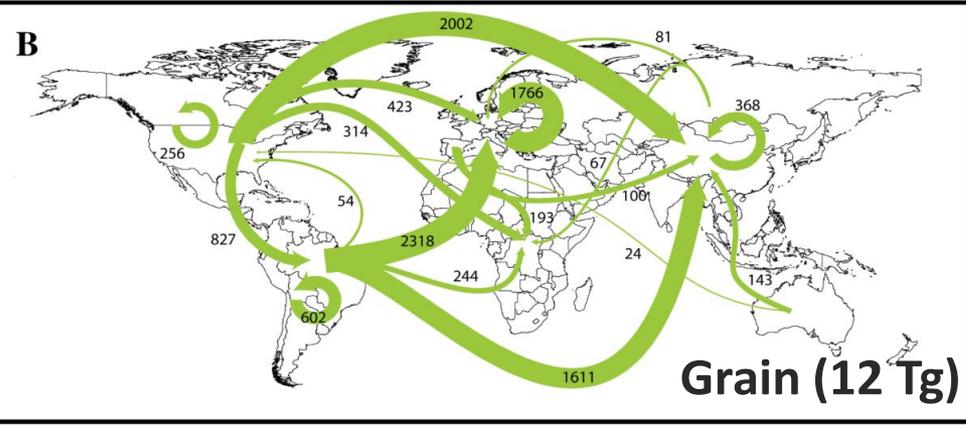
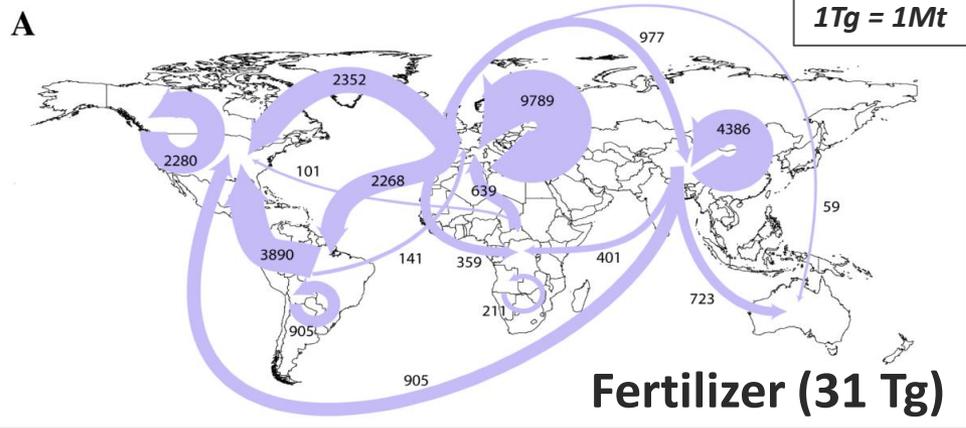
The nitrogen crisis is also protein crisis

Un-healthy EU27 dependencies

- **N fertiliser use = 10m t y⁻¹**
- **23% of N fertiliser is imported**
- **Imported protein = 70% (42Mt, 2009)**
- **N demand set to increase**

- Large inequality in N-fertiliser use

Galloway *et al.*, (2008). *Science* **320**, 889.
 Erisman *et al.*, (2008). *Nature Geosci.* **1**, 636.
 Seufert *et al.*, (2012) *Nature* **485**, 229.



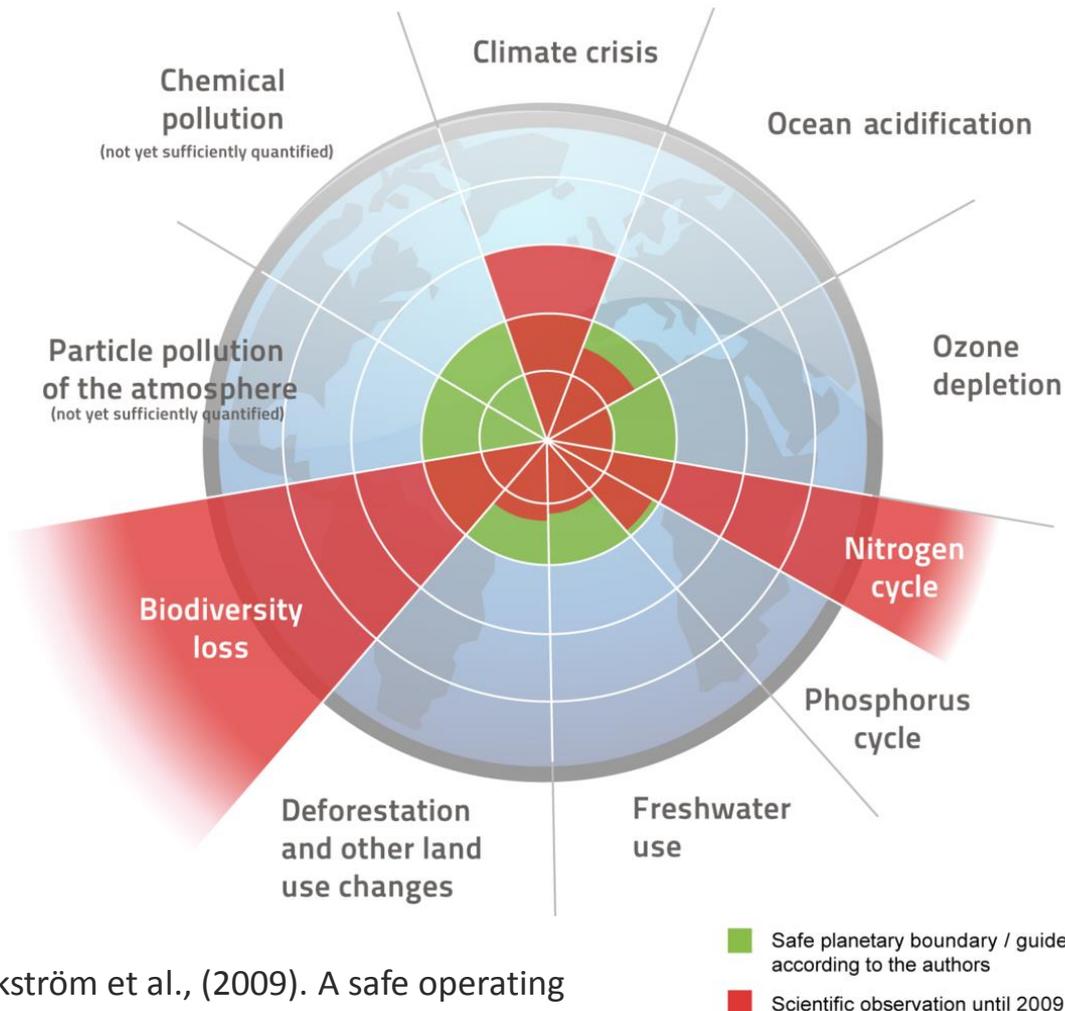
Transforming the nitrogen cycle



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Planetary Boundaries

after Johan Rockström, Stockholm Resilience Centre et al. 2009



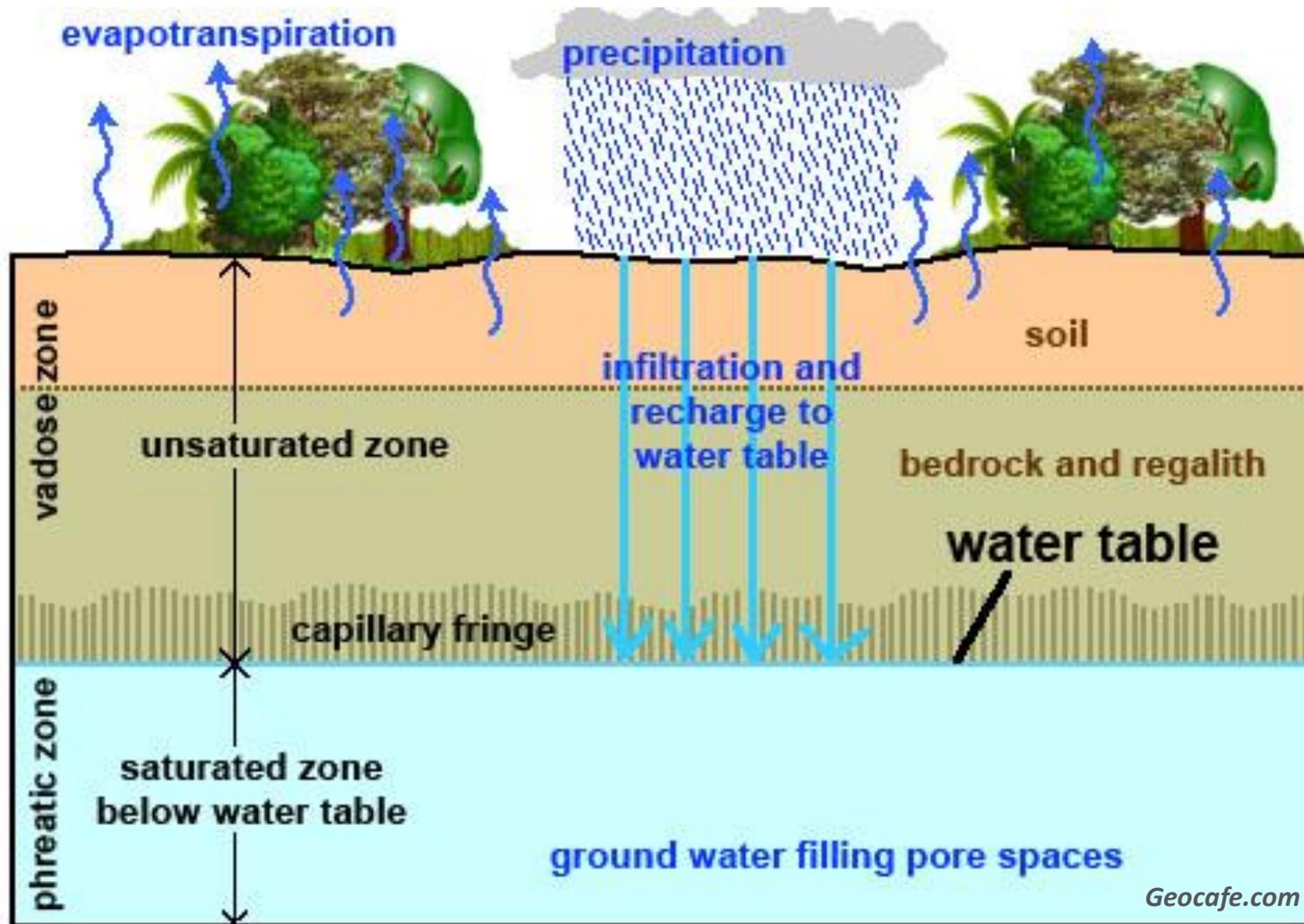
Planetary Boundaries

Rockström et al., (2009). A safe operating space for humanity. *Nature* **461**, 472.

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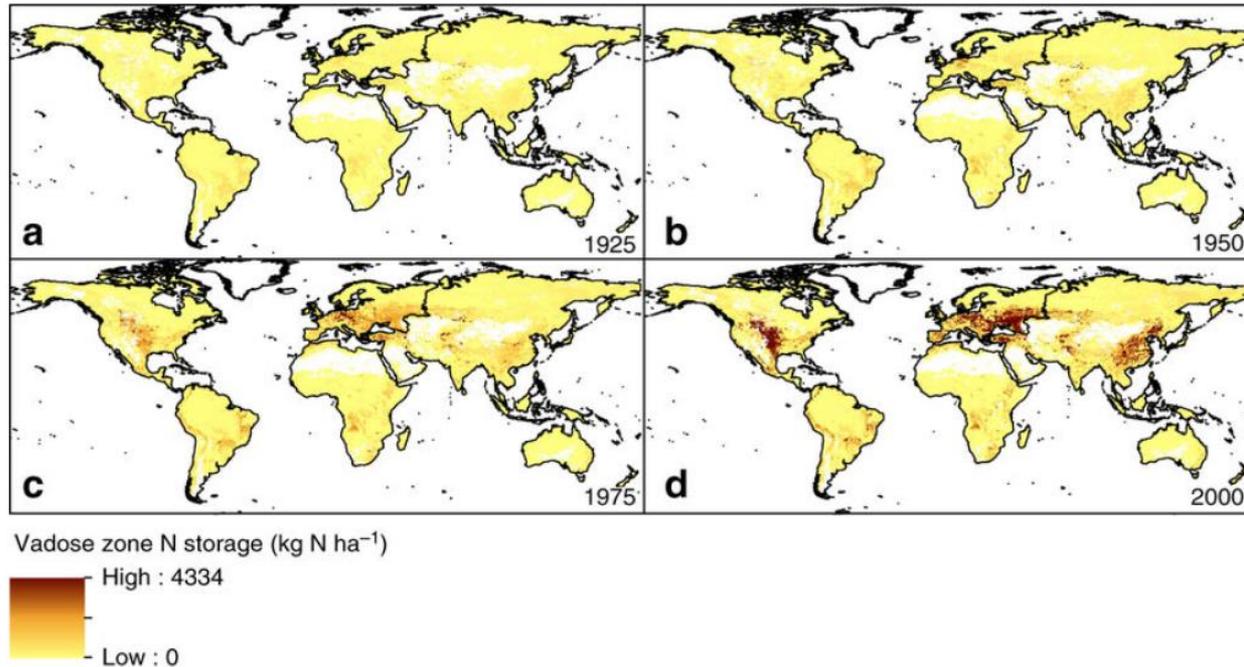


The nitrate “time-bomb”



The nitrate “time-bomb”

From: Global patterns of nitrate storage in the vadose zone



Spatial distribution of nitrate stored in the vadose zone. Global vadose zone N storage (in kg N ha^{-1}) is shown for 1925 (a), 1950 (b), 1975 (c) and 2000 (d)

Ascott, M.J., Goody, D.C., Wang, L., Stuart, M.E., Lewis, M.A., Ward, R.S., Binley, A.M. (2017)
Global patterns of nitrate storage in the vadose zone. *Nature Communications*, 8(1), p.1416.

<https://www.nature.com/articles/s41467-017-01321-w>

<http://www.bbc.co.uk/news/science-environment-41945650>



The best fertiliser is a good gross margin



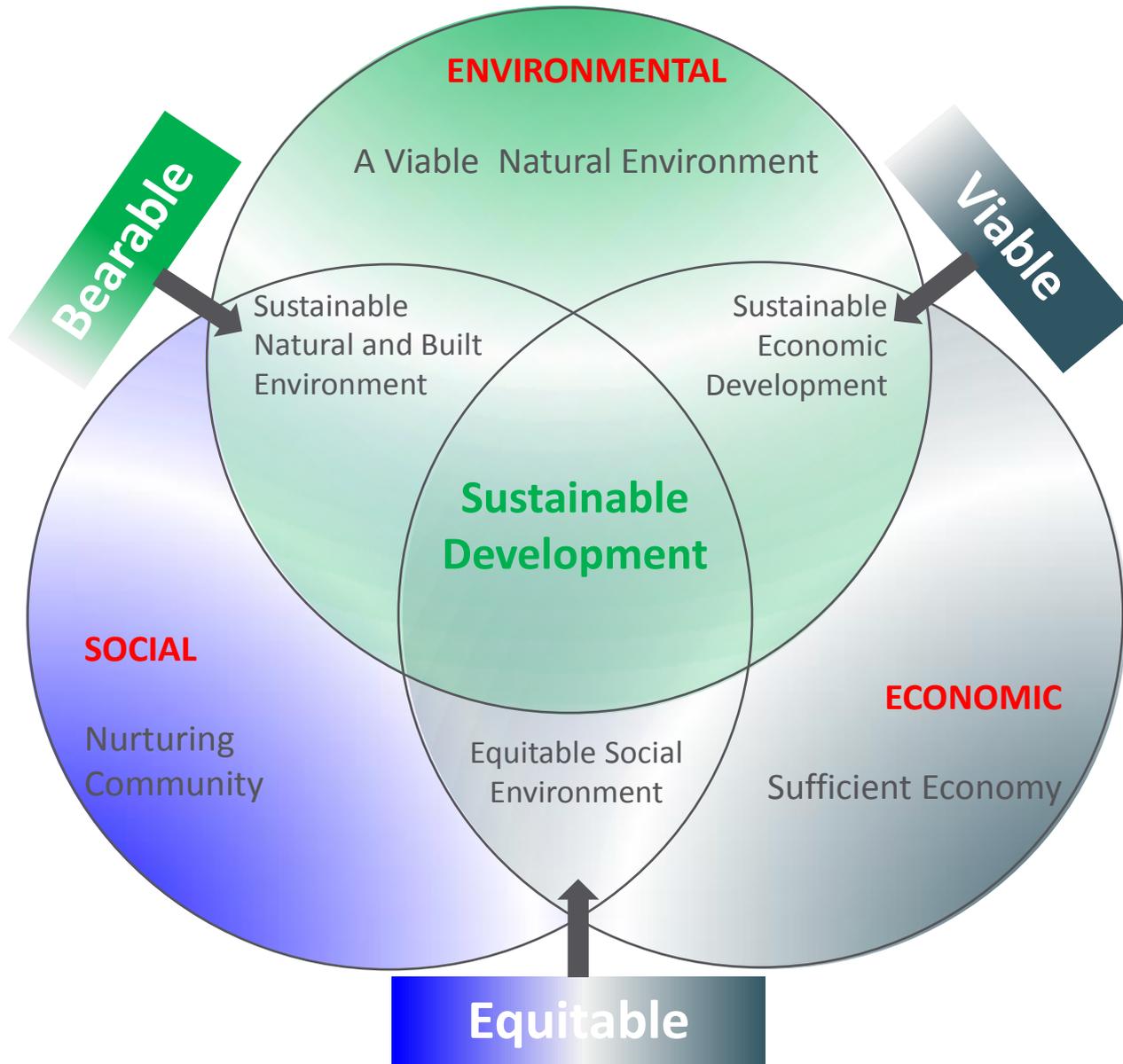
There is a need to develop new business models for sustainable legume-dependant agriculture which into account ecosystem benefits beyond GDP (gross domestic product)



The 'Three Pillars of Sustainability'



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