« Carbon Sequestration in the soil for Agriculture and Mitigation »

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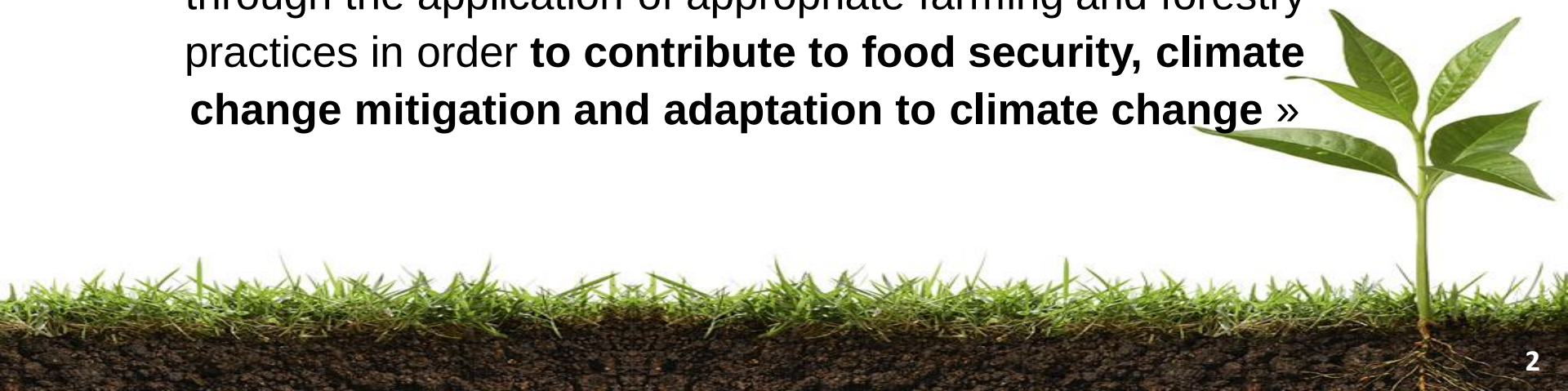
What is the 4 pour 1000 Initiative ?

- As part of the **Global Climate Action Agenda**, launched at the UNFCCC COP 21

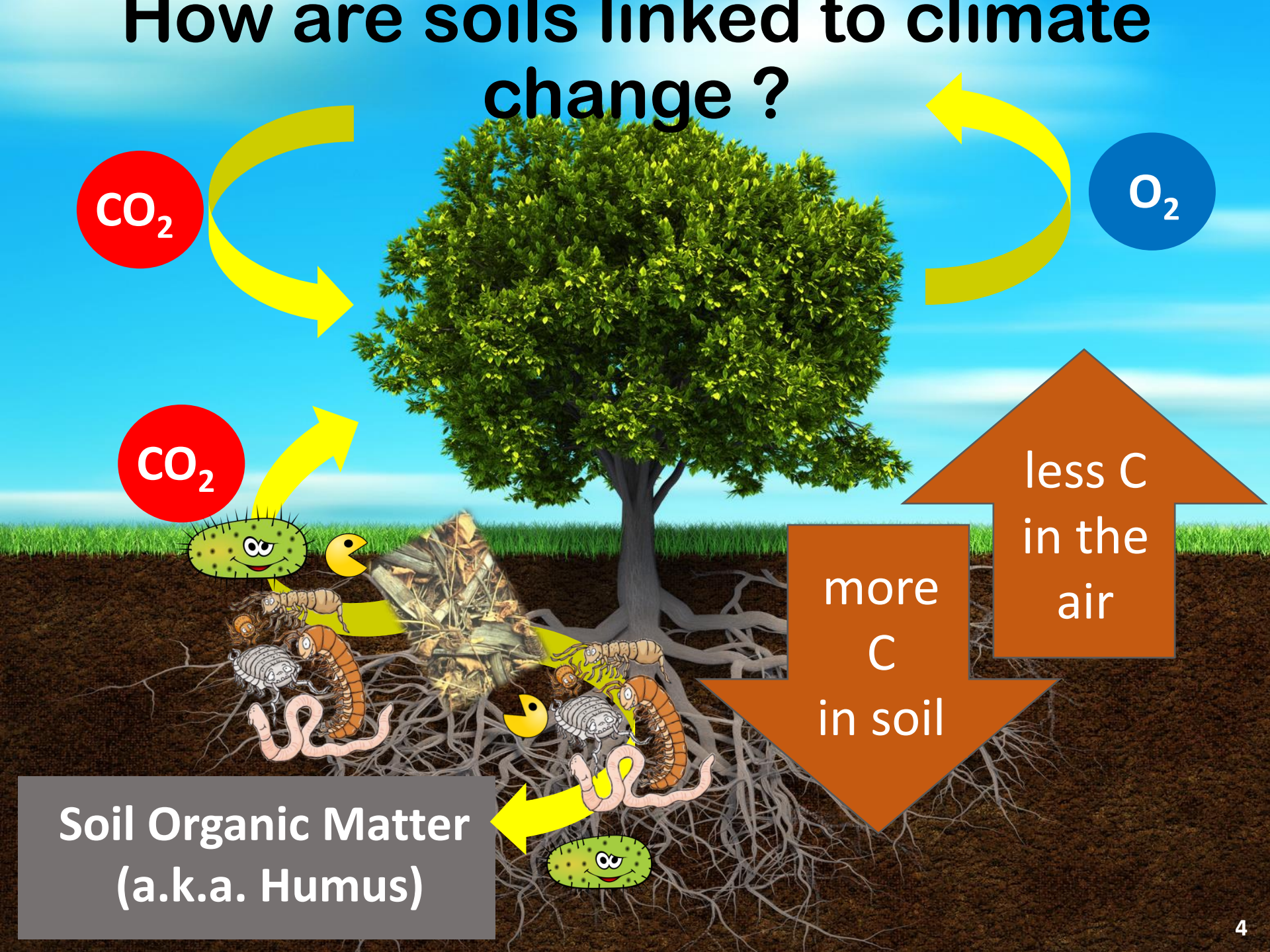
- General aim:

« **Increase organic matter and promote soil C sequestration**, through the application of appropriate farming and forestry practices in order **to contribute to food security, climate change mitigation and adaptation to climate change** »



Role of SOC in the biosphere

How are soils linked to climate change ?



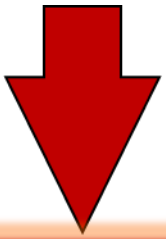
Carbon sequestration in soils is…

«the process of **transferring** CO_2 from the atmosphere into the soil of a land unit, through plants, plant residues and other organic solids which are stored or retained in the unit as part of the **soil organic matter** (humus)»

CHENU, C., Soil & Tillage Research (2018), https://doi.org/10.1016/j.still.2018.04.011

…part of the global C cycle

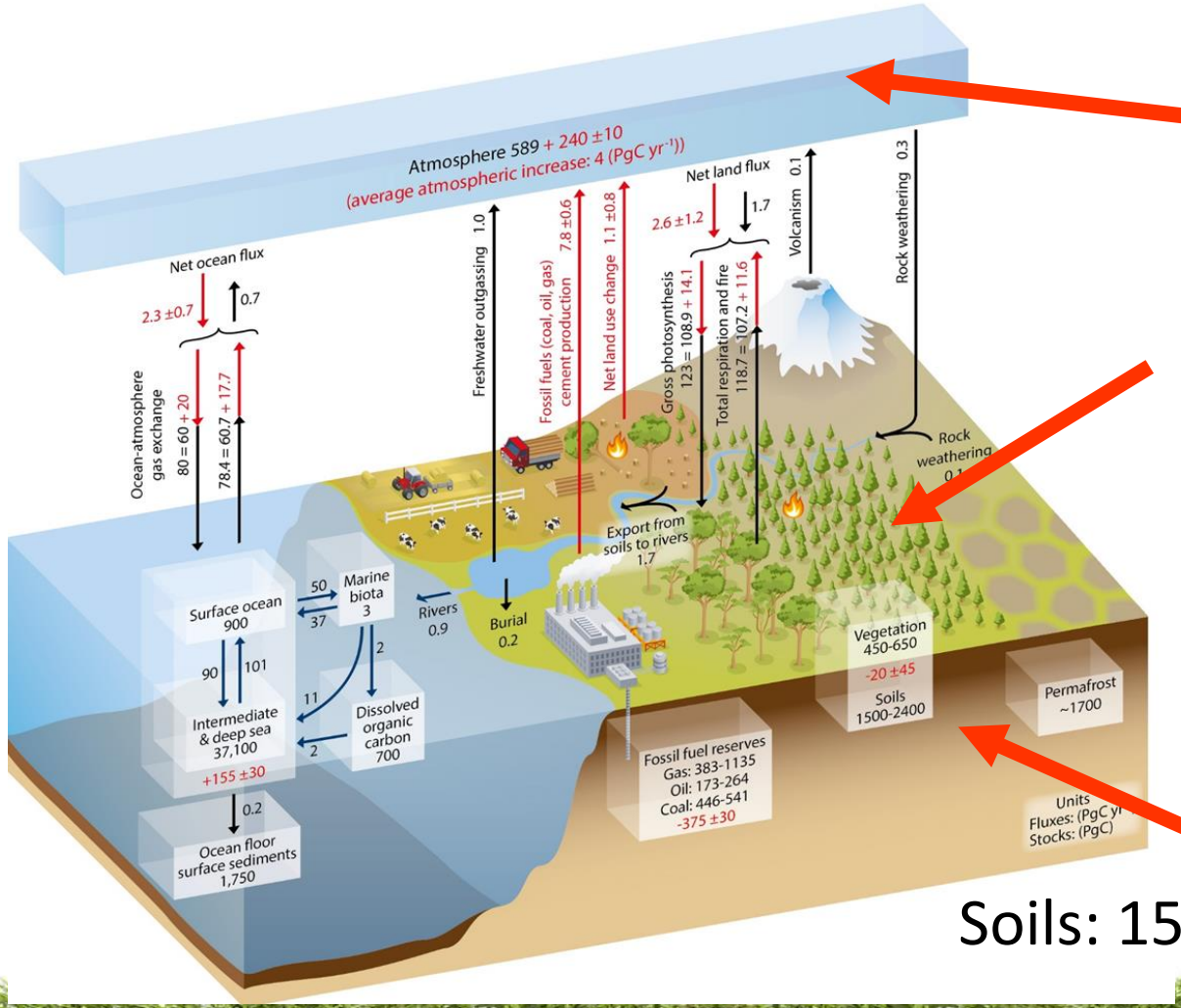
«Retention time of sequestered carbon in the soil (terrestrial pool) can range from short-term (not immediately released back to the atmosphere) to long-term (millenia) storage.»



Different fractions of soil carbon have different „stability“!

CHENU, C., Soil & Tillage Research (2018), https://doi.org/10.1016/j.still.2018.04.011

Soils represent the largest terrestrial carbon reservoir



Atmosphere: 589 PgC

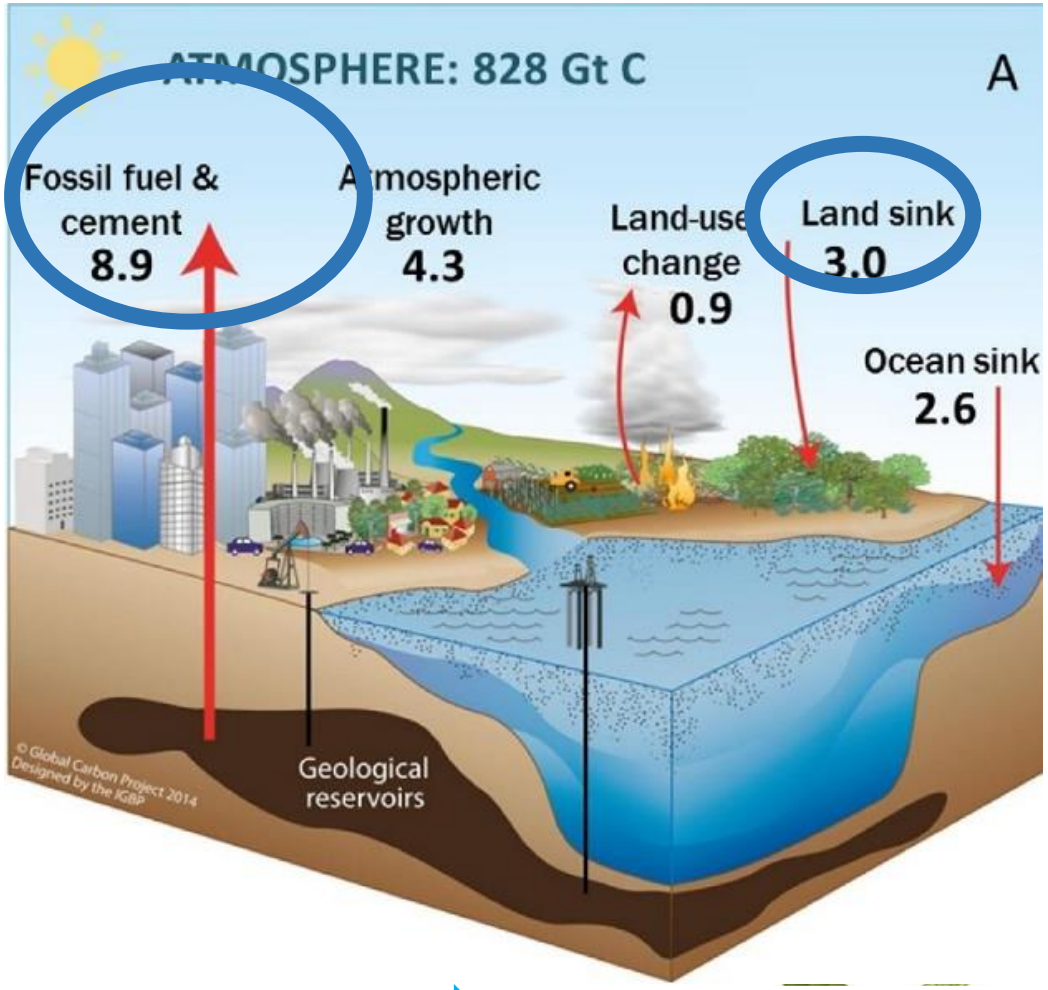
Vegetation: 450-650 PgC

2-4x

3-5x

Soils: 1500-2400 PgC

Carbon Sequestration= Mitigation potential ?



1500 Gt C **0,4% (4‰)** 6 Gt C

Minasny et al.(2017): Soil Carbon 4 per mille. In: Geoderma

Why have soils lost so much C?

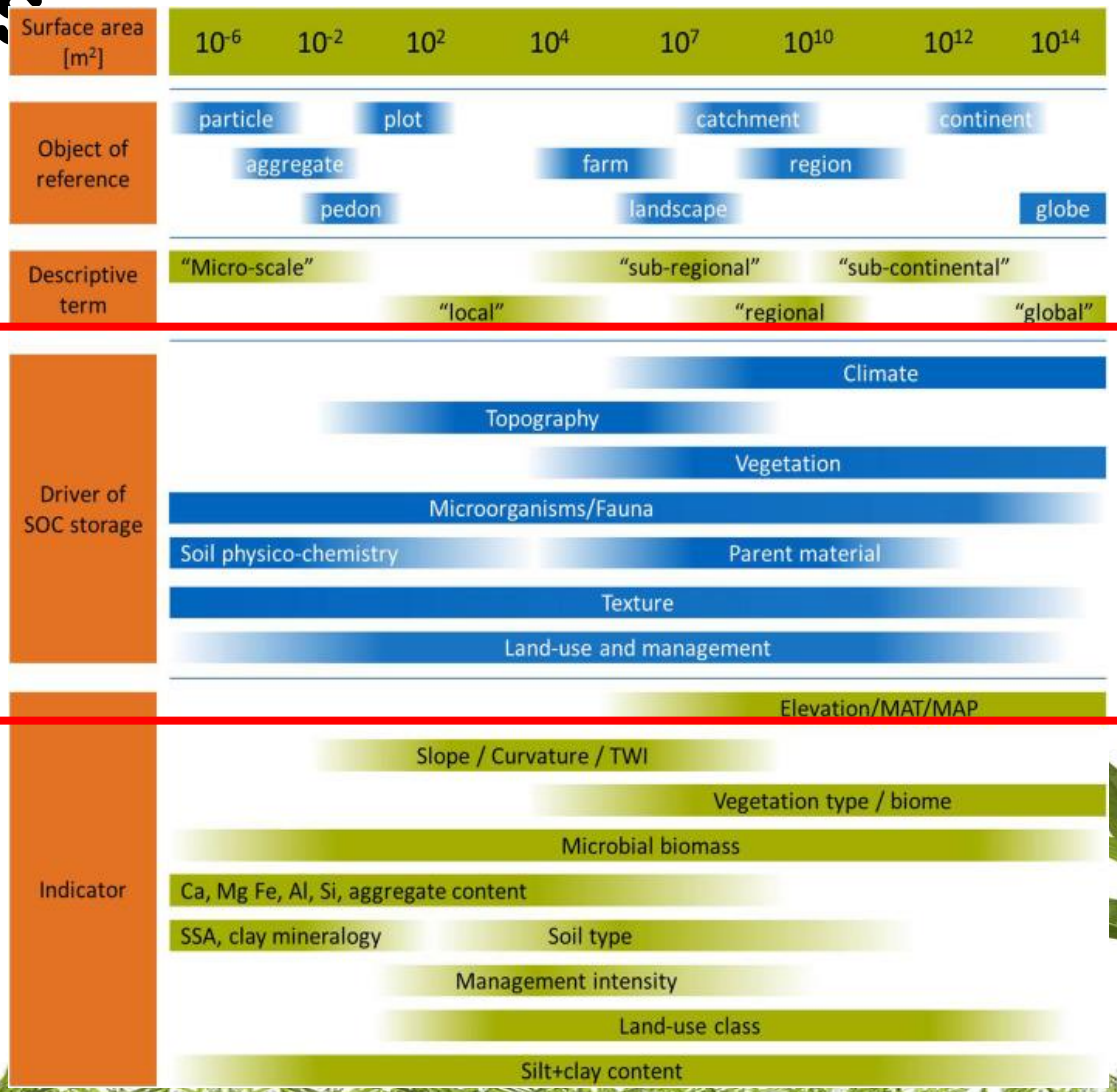
→ Main driver: Land-use change (incl. wetland drainage, biomass burning and removal)

- **1/3** of all anthropogenic greenhouse gas emissions was derived from land use changes between 1750 and 2011b

Teklemariam , D., Sustainability 2016, 8(3), 213; doi:10.3390/su8030213

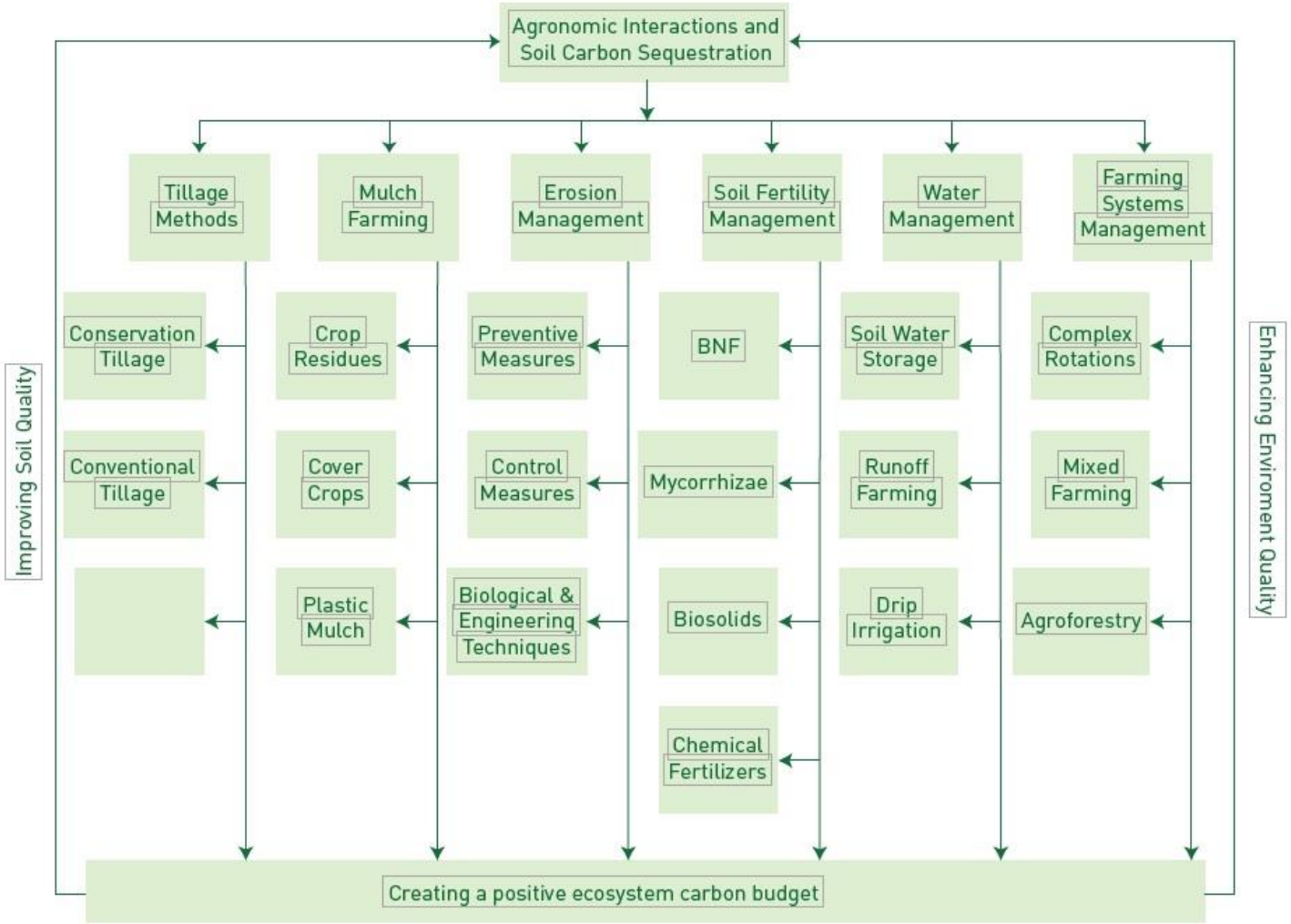
HARTMANN, D.L., et al., 2013: Observations: Atmosphere and Surface.
In: Climate Change 2013: The Physical Science Basis. Contribution of WG I to the AR5 of the IPCC, doi:10.1017/CBO9781107415324.008.

Carbon sequestration in soils- Drivers



Wiesmeier, H. et al. (2019), https://doi.org/10.1016/j.geoderma.2018.07.026

Management strategies for SOC sequestration



SOLAW Background Thematic Report TR04B: Soil carbon sequestration, FAO

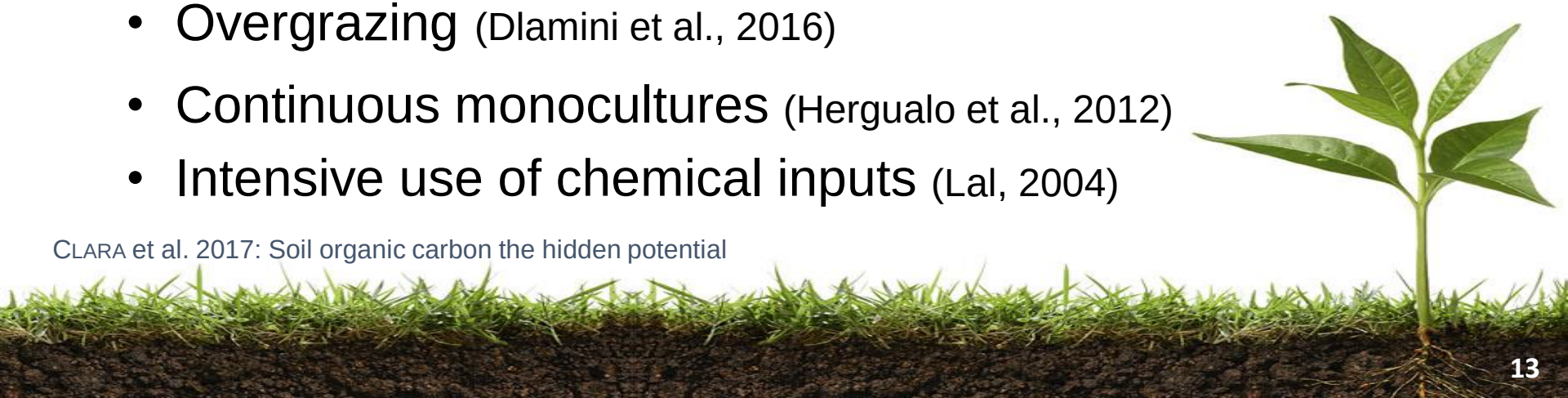
Benefits of carbon sequestration

Increase of :

- Water infilitration
- Nutrient retention and availability
- Germination
- Stabilization
- Use efficiency of inputs

Management practices decreasing SOC sequestration

- Deforestation (IPCC, 2007; Guo and Gifford, 2002)
- Biomass burning/residue removal (Lal, 2007; Anderson-Teixera et al., 2009)
- Consversion of natural wetlands (IPCC, 2007; Petreau et al., 2015)
- Bare fallows (Lal, 2004; Lal, 2001)
- Overgrazing (Dlamini et al., 2016)
- Continuous monocultures (Hergualo et al., 2012)
- Intensive use of chemical inputs (Lal, 2004)



CLARA et al. 2017: Soil organic carbon the hidden potential

Thank you for your attention…

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