



“It’s about the trees!”

Why agroforestry landscapes are money-making machines



















United Nations

Framework Convention on
Climate Change



**Convention on
Biological Diversity**



UNCCD

United Nations Convention
to Combat Desertification



Realization: Objective of the United Nations Framework Convention on Climate Change

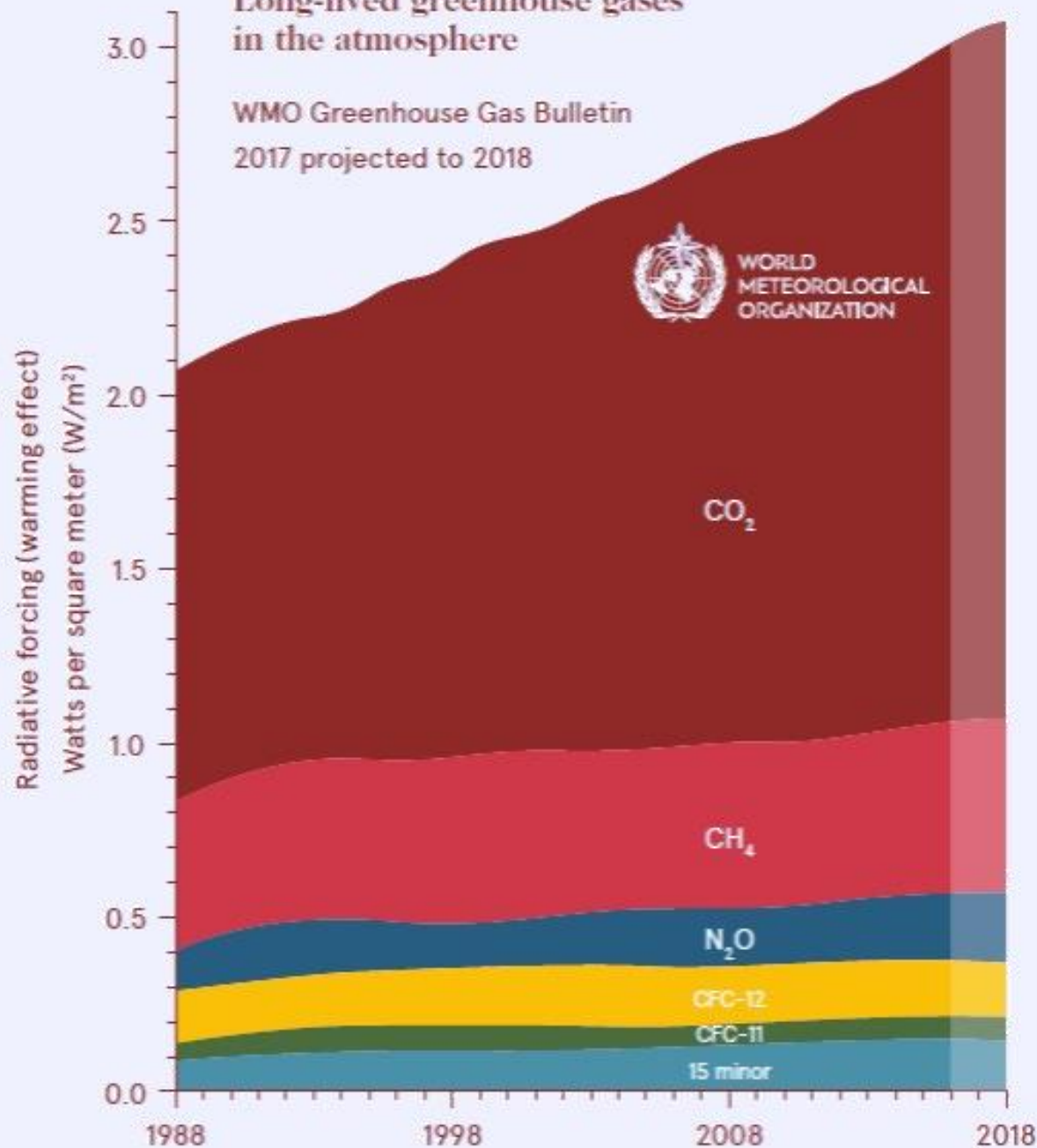
UNFCCC, Article 2, Objective: "stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."

UNFCCC Conference of the Parties (COP)	Year	Location	Negotiation Outcome	Emission Outcome CO ₂ parts per million	Emission Outcome Gigatonnes of CO ₂ per year	Emission Outcome Limit for 1.5° C Gigatonnes of CO ₂
COP 1	1995	Berlin	Berlin Mandate	360.1	27.8	880
COP 2	1996	Geneva	Geneva Ministerial Declaration Noted	361.8	28.3	852
COP 3	1997	Kyoto	Kyoto Protocol	362.9	30.4	821
COP 4	1998	Buenos Aires	Buenos Aires Plan of Action	365.5	28.4	793
COP 5	1999	Bonn	Bonn Agreement	367.6	29.3	765
COP 6	2000	The Hague	Bonn Agreements Consensus	370.1	29.4	735
COP 7	2001	Marrakesh	Marrakesh Ministerial Declaration Adopted	372.4	30.4	706
COP 8	2002	Delhi	Declaration on Climate Change & Sustainable Development	375.0	32.0	676
COP 9	2003	Milan	Climate Change Fund & Least Development Countries Fund	376.8	33.1	644
COP 10	2004	Buenos Aires	Complete Marrakesh Accords	378.8	33.8	610
COP 11	2005	Montreal	Global Environmental Facility Guideline	380.9	35.0	577
COP 12	2006	Nairobi	Nairobi Framework Welcomed	382.7	35.0	542
COP 13	2007	Bali	Bali Roadmap	384.8	36.2	507
COP 14	2008	Poznan	Adaptation Fund	386.3	37.4	470
COP 15	2009	Copenhagen	Copenhagen Accord	388.6	38.5	433
COP 16	2010	Cancun	Cancun Agreements	390.5	39.6	395
COP 17	2011	Durban	Durban Platform for Enhanced Action	392.5	40.5	355
COP 18	2012	Doha	Doha Amendments to the Kyoto Protocol	395.2	40.9	314
COP 19	2013	Warsaw	Warsaw Agreements	397.1	41.1	274
COP 20	2014	Lima	Lima Call for Climate Action	399.4	41.6	232
COP 21	2015	Paris	Paris Agreement	402.9	40.8	191
COP 22	2016	Marrakech	Marrakech Action Proclamation	405.0	41.1	150
COP 23	2017	Bonn	Fiji Momentum for Implementation	408 ?	42 ?	109
COP 24	2018	Katowice	...			67

Long-lived-greenhouse gases

Long-lived greenhouse gases in the atmosphere

WMO Greenhouse Gas Bulletin
2017 projected to 2018

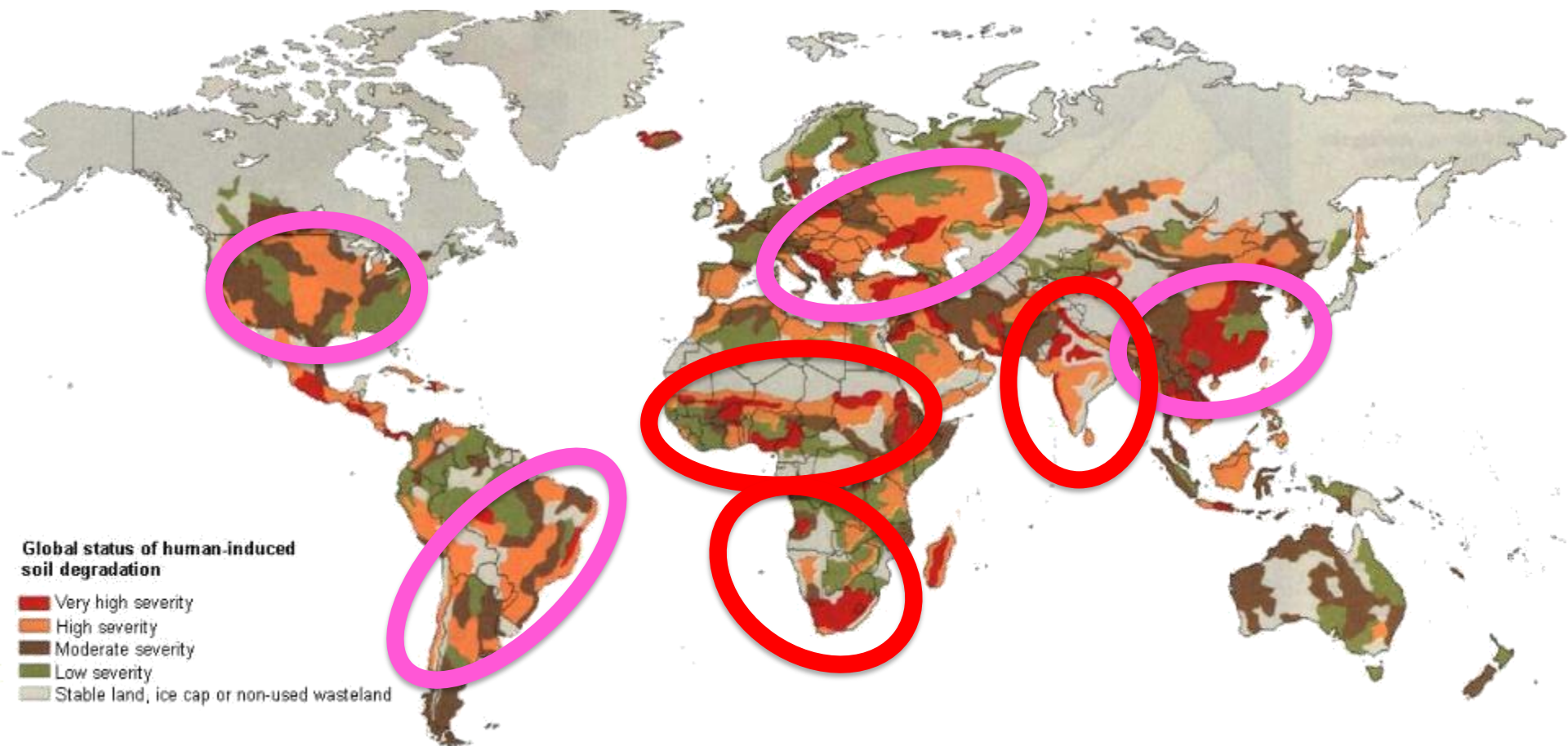


IPBES Major findings



The Intergovernmental Platform on Biodiversity and Ecosystem Services

- There are instances of land degradation in virtually **every ecosystem type in the world**, and in every country.
- The severity and consequences vary, depending on the **social and ecological context**, and **when** the degradation took place.
- The problem is **ongoing and worsening**, rather than improving, as the demands we place on land increases and its capacity to satisfy them is progressively and persistently weakened.
- Present efforts to address the problem have demonstrated that it is **possible to make a difference**, but **the current level of effort is far below that required**.



Jordán, A. (2015) European Geosciences Union







assumes 2014 levels of... continue in proportion to the growth in global markets.

DRAWDOWN

NOTE: This analysis includes... (e.g., distributed), Grid Flexibility, Microgrids, Net-Zero Buildings, and Retrofitting were not modeled independently to avoid double counting impacts from other solutions.



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Rank	Solution	Sector	TOTAL ATMOSPHERIC CO ₂ -EQ REDUCTION (GT)	NET COST (BILLIONS US \$)	SAVINGS (BILLIONS US \$)
1	Refrigerant Management	Materials	89.74	N/A	\$-902.77
2	Wind Turbines (Onshore)	Electricity Generation	84.60	\$1,225.37	\$7,425.00
3	Reduced Food Waste	Food	70.53	N/A	N/A
4	Plant-Rich Diet	Food	66.11	N/A	N/A
5	Tropical Forests	Land Use	61.23	N/A	N/A
6	Educating Girls	Women and Girls	59.60	N/A	N/A
7	Family Planning	Women and Girls	59.60	N/A	N/A
8	Solar Farms	Electricity Generation	36.90	\$-80.60	\$5,023.84
9	Silvopasture	Food	31.19	\$41.59	\$699.37
10	Rooftop Solar	Electricity Generation	24.60	\$453.14	\$3,457.63
11	Regenerative Agriculture	Food	23.15	\$57.22	\$1,928.10
12	Temperate Forests	Land Use	22.61	N/A	N/A
13	Peatlands	Land Use	21.57	N/A	N/A
14	Tropical Staple Trees	Food	20.19	\$120.07	\$626.97
15	Afforestation	Land Use	18.06	\$29.44	\$392.33
16	Conservation Agriculture	Food	17.35	\$37.53	\$2,119.07
17	Tree Intercropping	Food	17.20	\$146.99	\$22.10
18	Geothermal	Electricity Generation	16.60	\$-155.48	\$1,024.34
19	Managed Grazing	Food	16.34	\$50.48	\$735.27
20	Nuclear	Electricity Generation	16.09	\$0.88	\$1,713.40
21	Clean Cookstoves	Food	15.81	\$72.16	\$166.28
22	Wind Turbines (Offshore)	Electricity Generation	14.10	\$545.30	\$762.50
23	Farmland Restoration	Food	14.08	\$72.24	\$1,342.47

Comment | Published: 10 January 2019

A global agenda for collective action on soil carbon

Policymakers and investors have perceived securing soil organic carbon as too difficult, with uncertain returns. But new technical, policy and financial opportunities offer hope for rapid progress.

Sonja Vermeulen, Deborah Bossio, Johannes Lehmann, Paul Luu, Keith Paustian, Christopher Webb, Flore Augé, Imelda Bacudo, Tobias Baedeker, Tanja Havemann, Ceris Jones, Richard King, Matthew Reddy, Ishmael Sunga, Moritz Von Unger and Matthew Warnken

Growing visibility and international frameworks for soil organic carbon are not yet matched by investment and action at scale. Soils, mostly privately owned but delivering public goods, are managed under a miscellany of governance arrangements, from local to global¹. While there have been compelling calls for action on soils, diverse protagonists across business^{1,2}, governments and civil society who seek to secure soil organic carbon recognize barriers beyond their individual

Key protagonists

Farmers and land managers

Including farmers' organizations

Policy and civil representation

Parliamentarians, government agencies, parastatals and NGOs

Supply chain

Input suppliers, traders, processors, retailers and customers

Finance

Banks, funds, insurers, philanthropy and development assistance

Technical and science

Project managers, registries, consultants, researchers and extension services

International bodies and processes

UNCCD, UNFCCC, SDGs, Global Soil Partnership, WBCSD, Nature4Climate and 4 per 1000

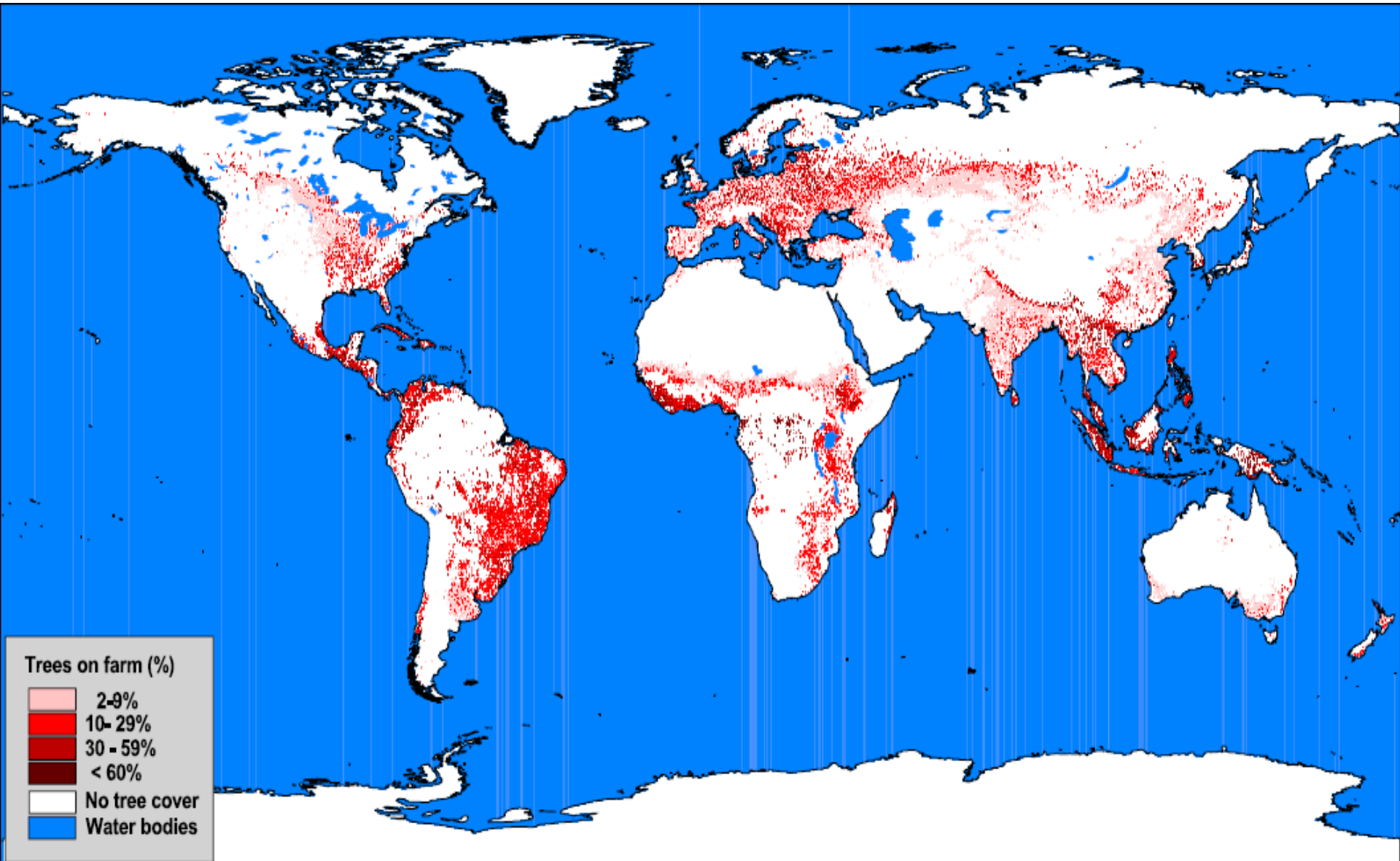
Priorities to increase momentum

Over-arching political case and vision for action

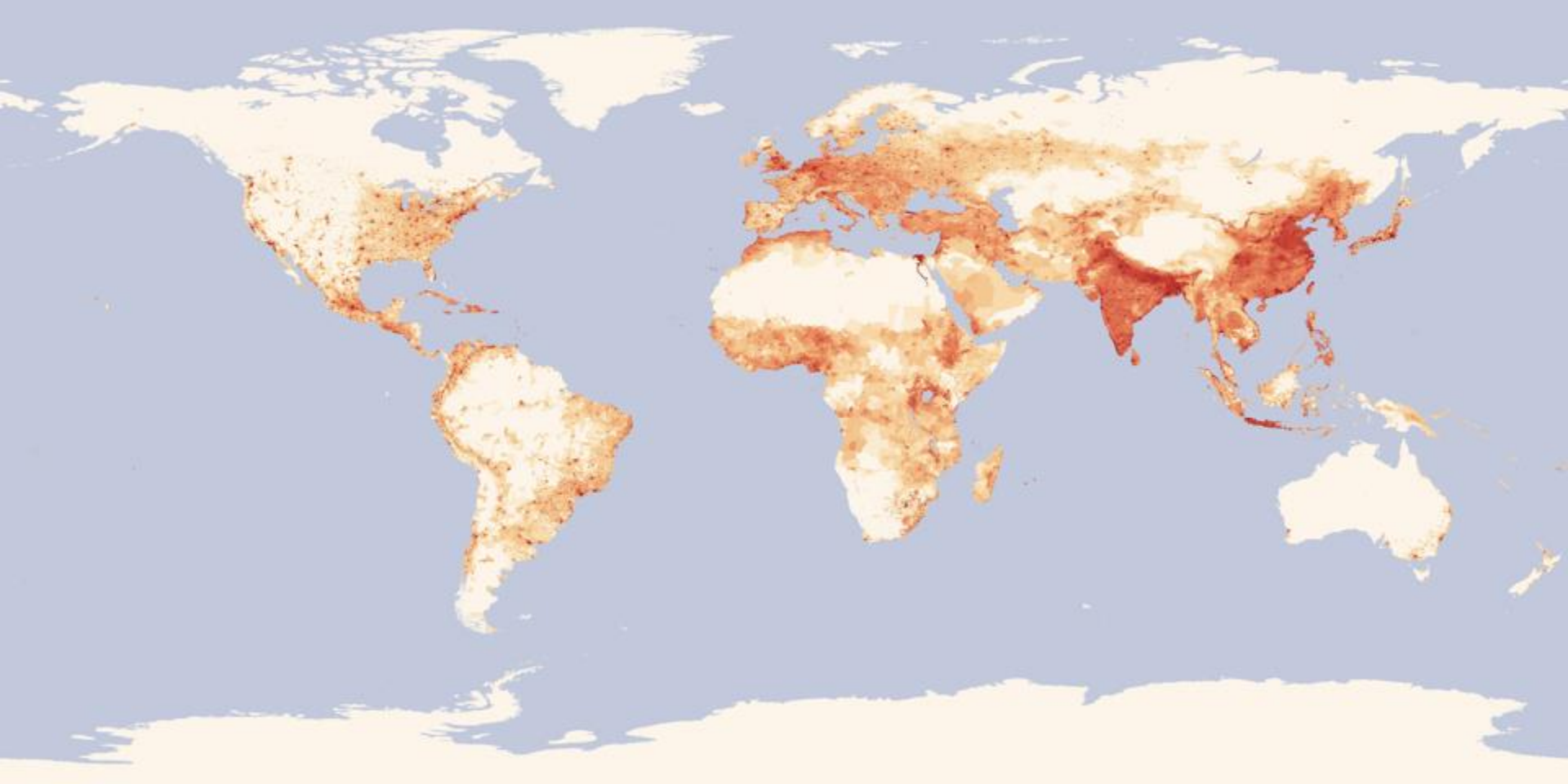
Stronger business case for public and private investors

More compelling value proposition for farmers and land managers

The prevalence of trees on farms shows...



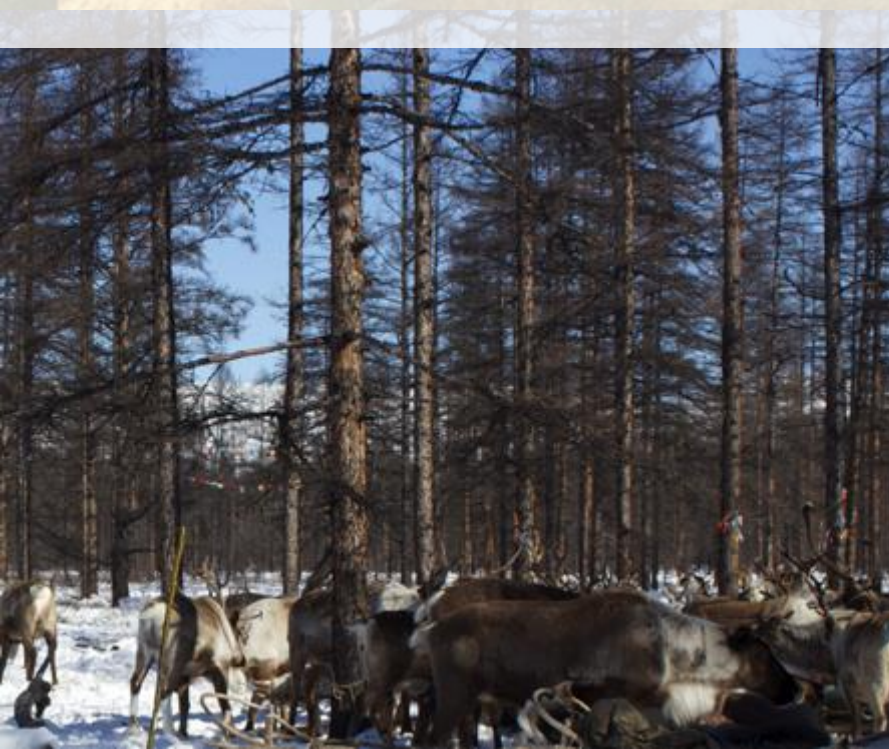
... that trees and people cohabit everywhere.



Global population density



That's because trees work for their living.



France: *wheat, timber*



Liagre F., personal communication

Poland: *beef, juicing apples*



Portugal: *livestock, cork*



UK: *fuelwood, horticulture*



Netherlands: *poultry, apples*



Arctic taiga: *meat, timber, wood pellets*

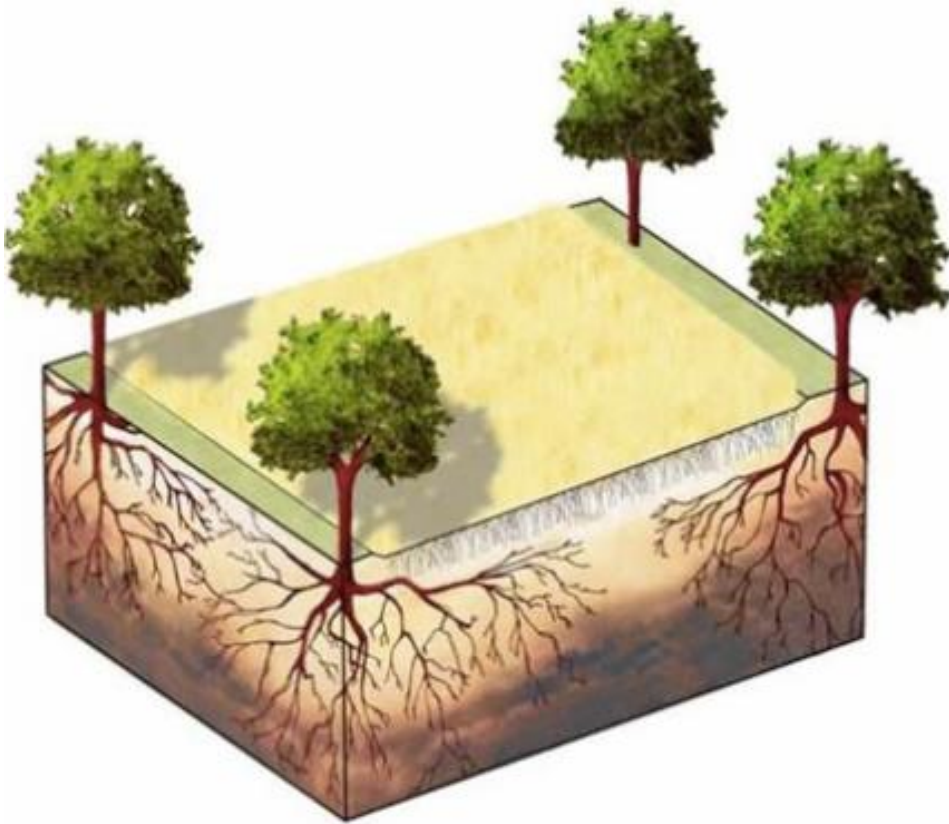




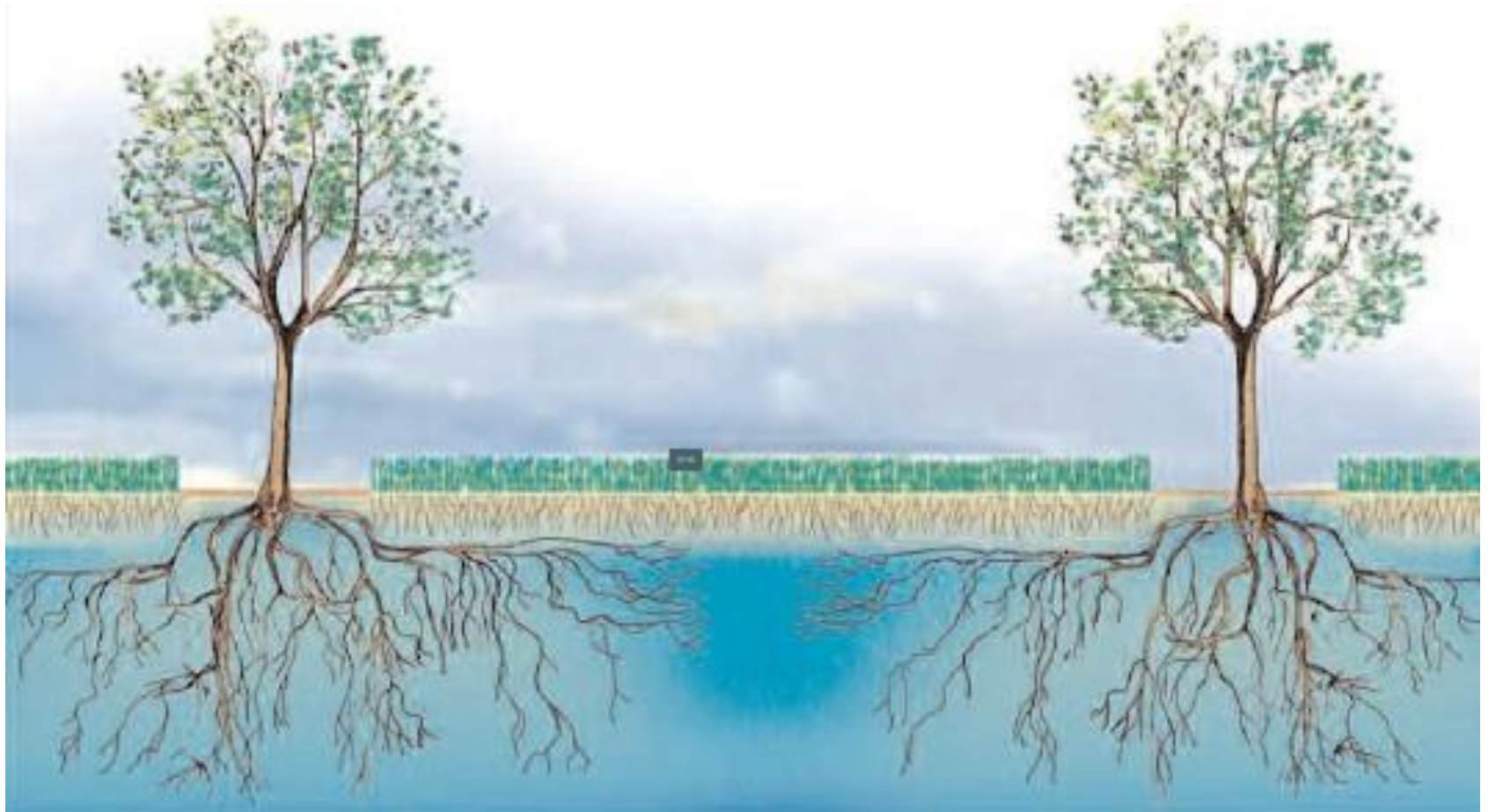
Why?

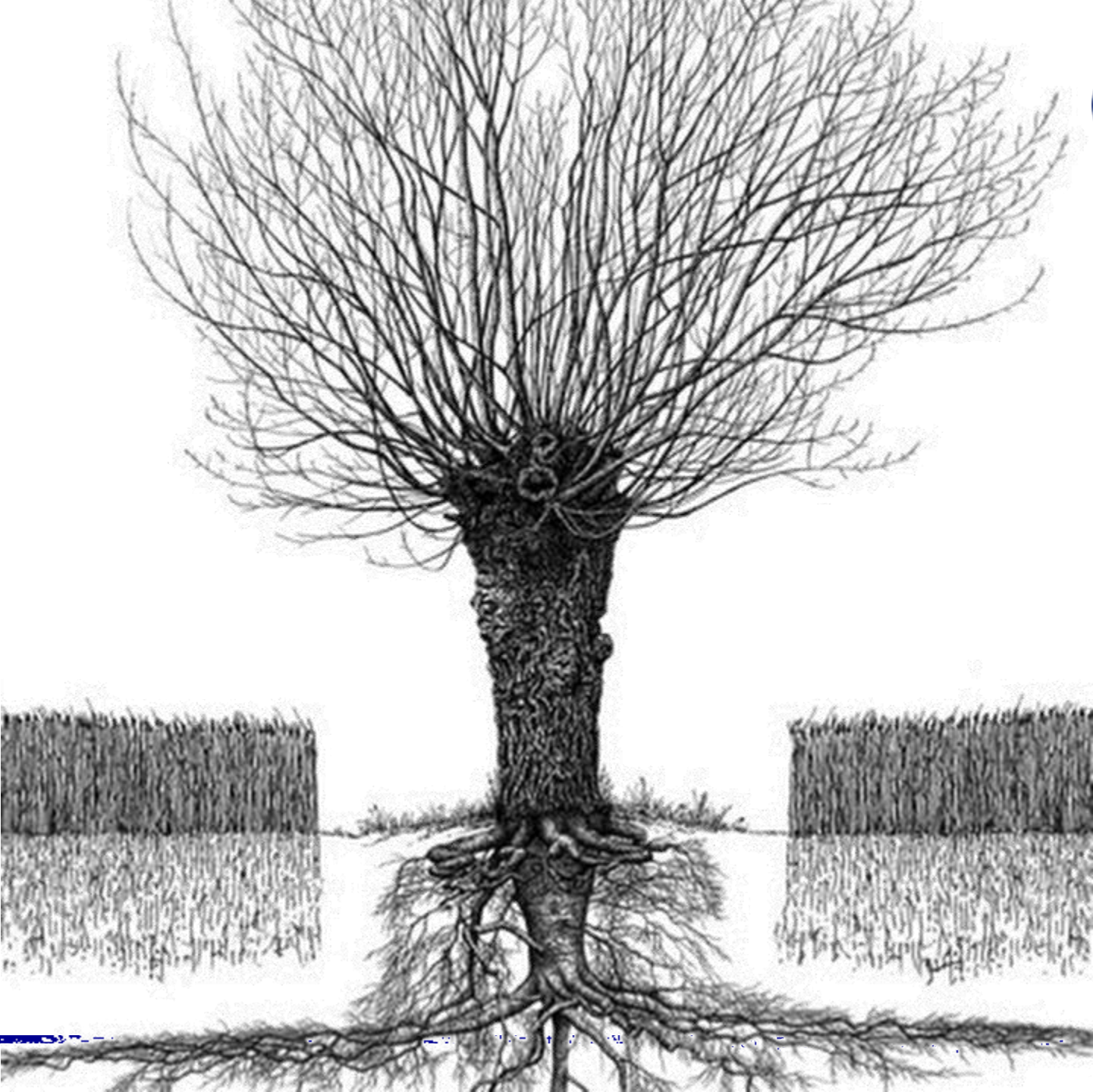


Nutrient cycling



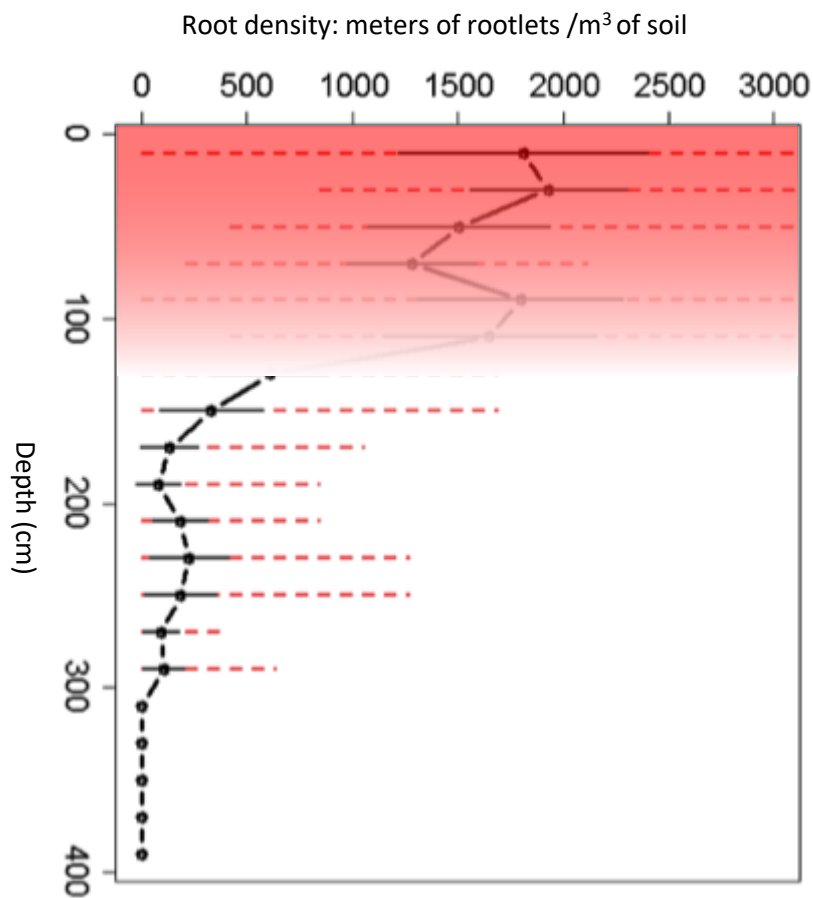
Water cycle buffering





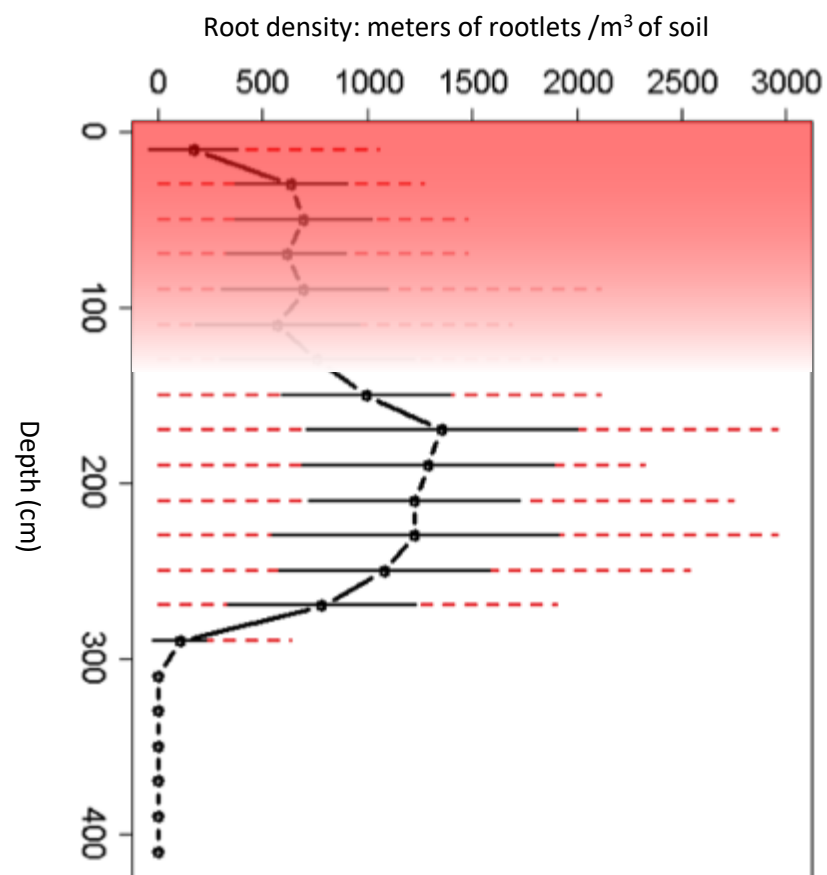
Forestry:

most roots close to surface



Agroforestry:

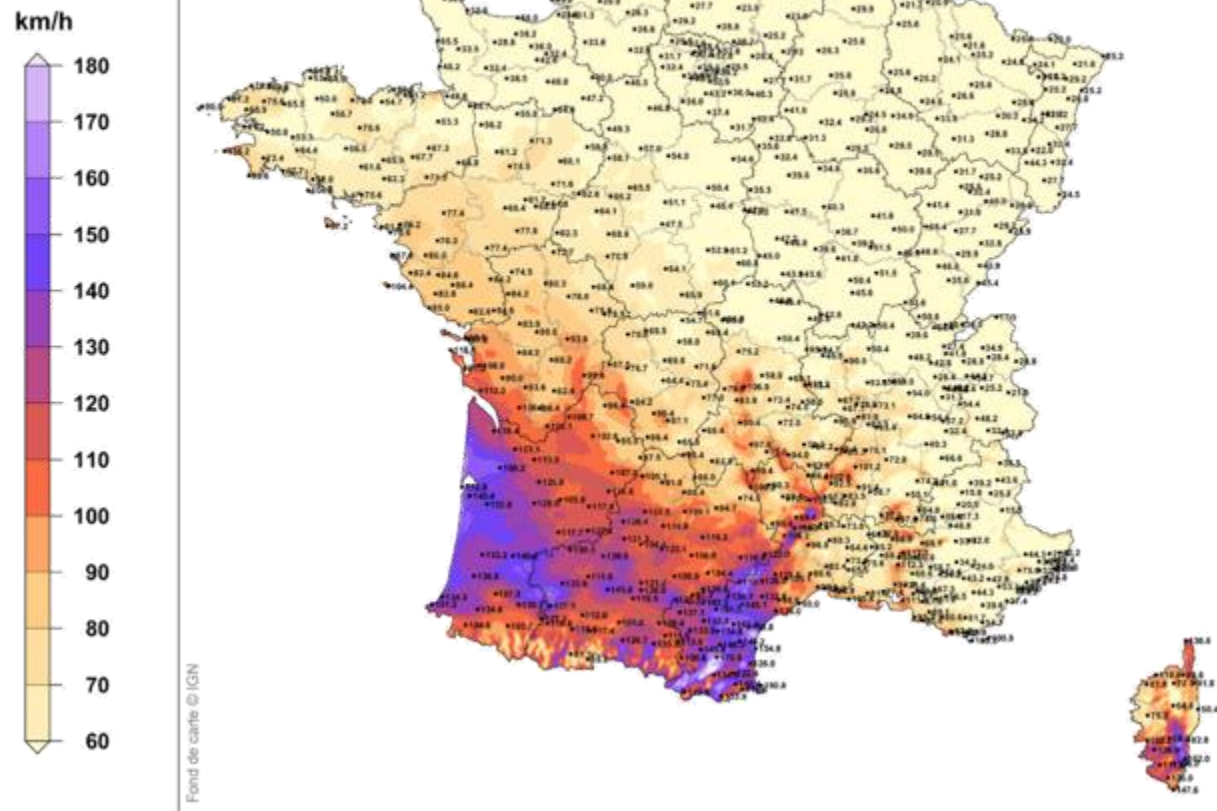
most roots at depth



Agroforestry and wind resistance



Storm *Klaus*
January 2009



A local forest just after *Klaus*



An agroforestry system the summer after *Klaus*



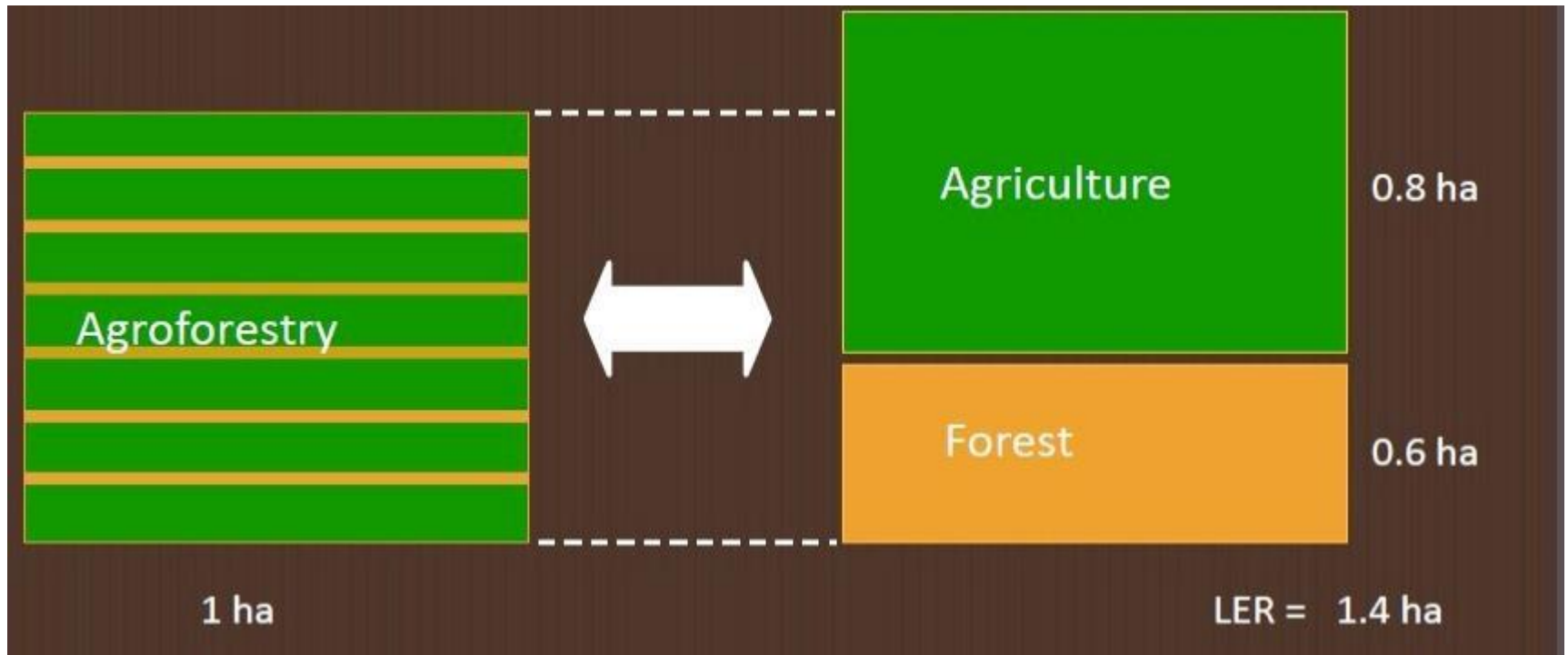
Late summer, *no photosynthesis!*



Late summer, *photosynthesis!*



Thus, Land Equivalency Ratio always > 1



Wakelyns Farms, UK



	land area	yield	Value	Component	Total
	%	ha/yr	£/t	Output	Output
				£/ha/yr	£/ha/yr
Monoculture					
SRT Plantation Willow	100	8.33 odt	60	499.8	
					499.8
Organic wheat	100	5 t	270	1350	
					1350
Agroforestry					
Willow	20	3.35 odt	60	201	
					201
Wheat 100%	67	4.68 t	270	1263.6	
Shaded wheat 50%	13	0.45 t	270	121.5	
		5.13 t	270		1385.1
					1586.1
LER = 1.43	3.35	$\frac{\text{Tree agroforestry yield}}{\text{Tree monoculture yield}} + \frac{\text{Crop or livestock agroforestry yield}}{\text{Crop or livestock monoculture yield}}$			5.13
	8.33				5

Walnut trees – winter cereals

40 Year rotation



1.4 to 1.6

LERs
Predicted
by models









AGFORWARD has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 613520.

AGFORWARD

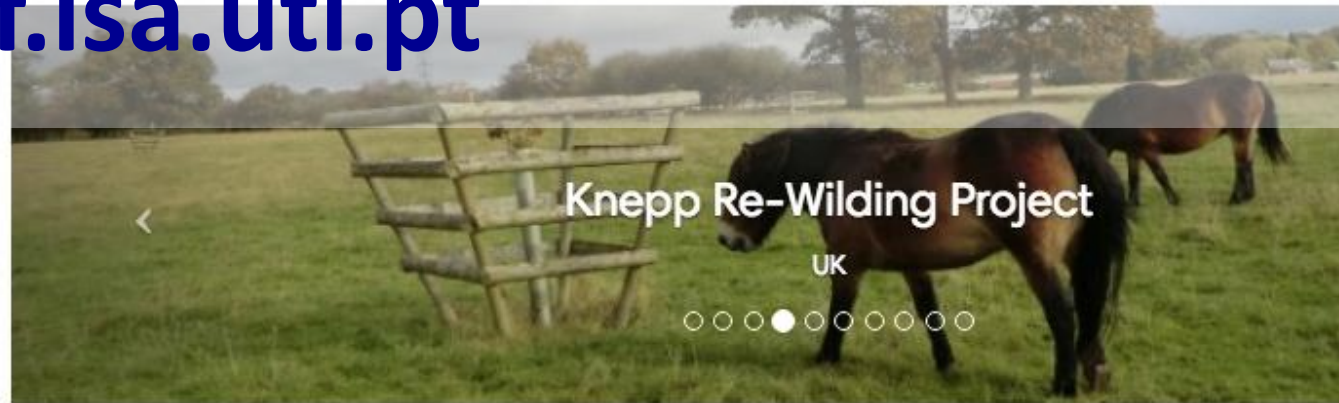
AGroFORestry that Will Advance Rural Development

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Feb 13, 2019

Featured Farm

Lynbreck Croft, highlands of
Scotland



Our goal at Lynbreck is to build a profitable, small farm business where every decision outcome must have a positive environmental impact.

"Rindergilde Geesthacht"
and "Family Farm Staggén"



The two featured farms are both based in the federal state of Schleswig-Holstein - Germany's most sparsely wooded federal state, located between the Baltic and the Northern Sea in Northwestern Germany. In 2017, both farms won an

"Juchowo Farm"
West



"Juchowo Farm" is located in North-Western Poland, near Szczecinek, operating on multi-functional land. It is one of the most multifunctional farms in the region and is a forerunner







Thank you

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Brazil: *oil palm, banana, coffee, timber...*



Nicaragua: *coffee, timber*



Uganda: *banana, coffee, vanilla*



Russia & central Asia: *wheat, timber, silk...*



Khleborobnoye
Хлебоборбное

Google

Imagery ©2016 DigitalGlobe, Cnes/Spot Image, Map data ©2016 Google

Niger: *sorghum*, *millet*, *F. Albida*



Tanzania: coffee, banana, cardamom...





Sumatra (damar +++)

Burkina Faso: Shea parklands

