



Harnessing the planet's power:

Why trees on farms are the future





iuaf.org

President



*Senior Science
Policy Adviser*



Vice-President,

**European
Agroforestry
Federation**



Trustee





7th Europe Agroforestry Conference 27 – 31 MAY 2024 Brno, CZ



INTERNATIONAL UNION FOR AGROFORESTRY

Uniting agroforesters around the world

WORLD CONGRESS ON AGROFORESTRY 2022

Agroforestry – the integration of woody perennials, palms or bamboo into cropland and pastures – is the future of nature-based farming.

Developed over millennia around the world and in every biome, from the terra preta food forests of Amazonia to the vast



6th World Congress on
AGROFORESTRY
KIGALI-RWANDA , 2025



Round-trip

Dublin X +



Kigali X +

Sat 5/11



Sat 5/18



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10:50 am – 12:20 am⁺¹

Turkish Airlines

1 stop

IST

12h 30m

DUB-KGL



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🔒 2

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1:10 am – 4:00 pm

Turkish Airlines

2 stops

EBB, IST

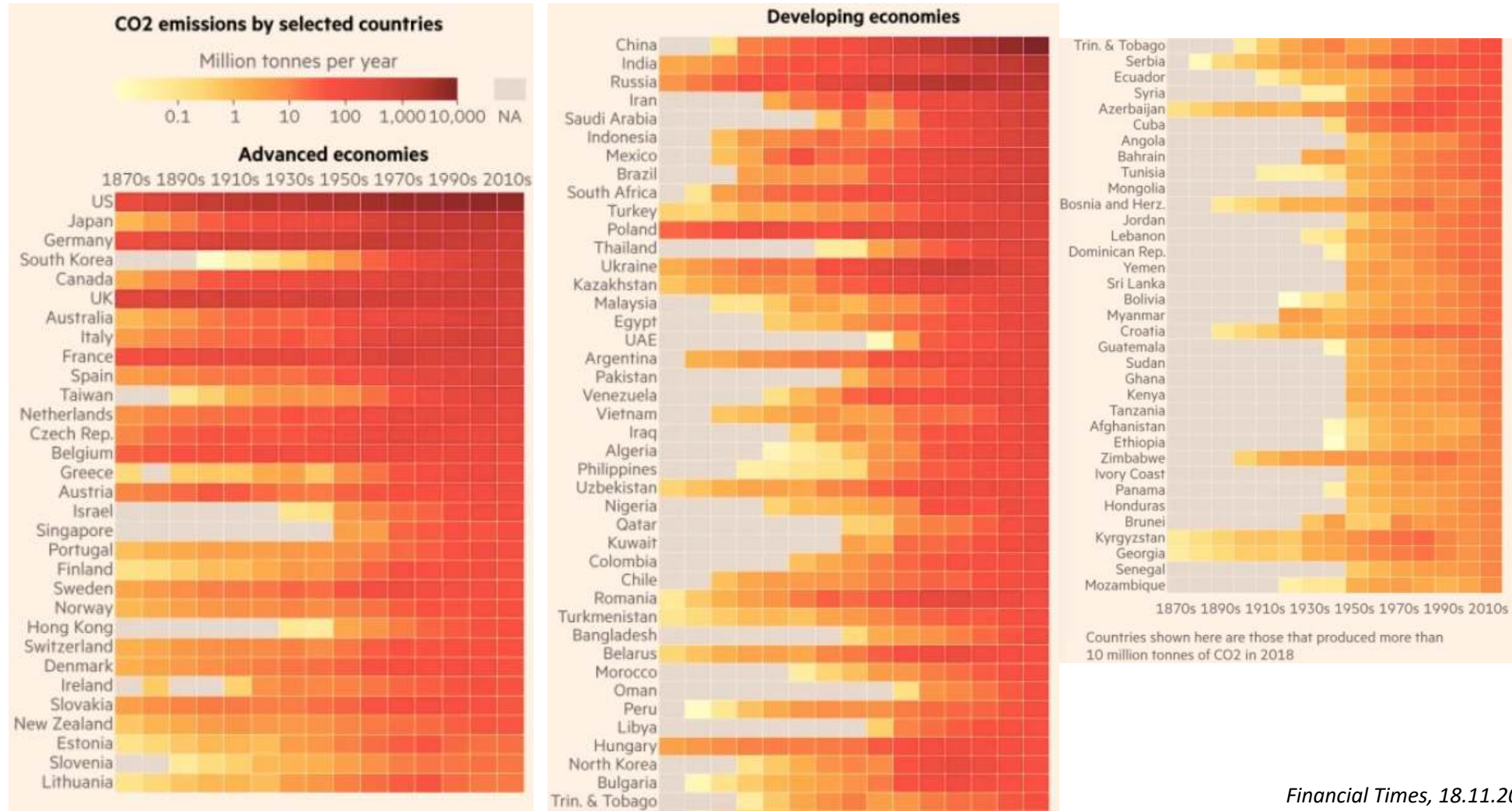
15h 50m

KGL-DUB

Promotion €749
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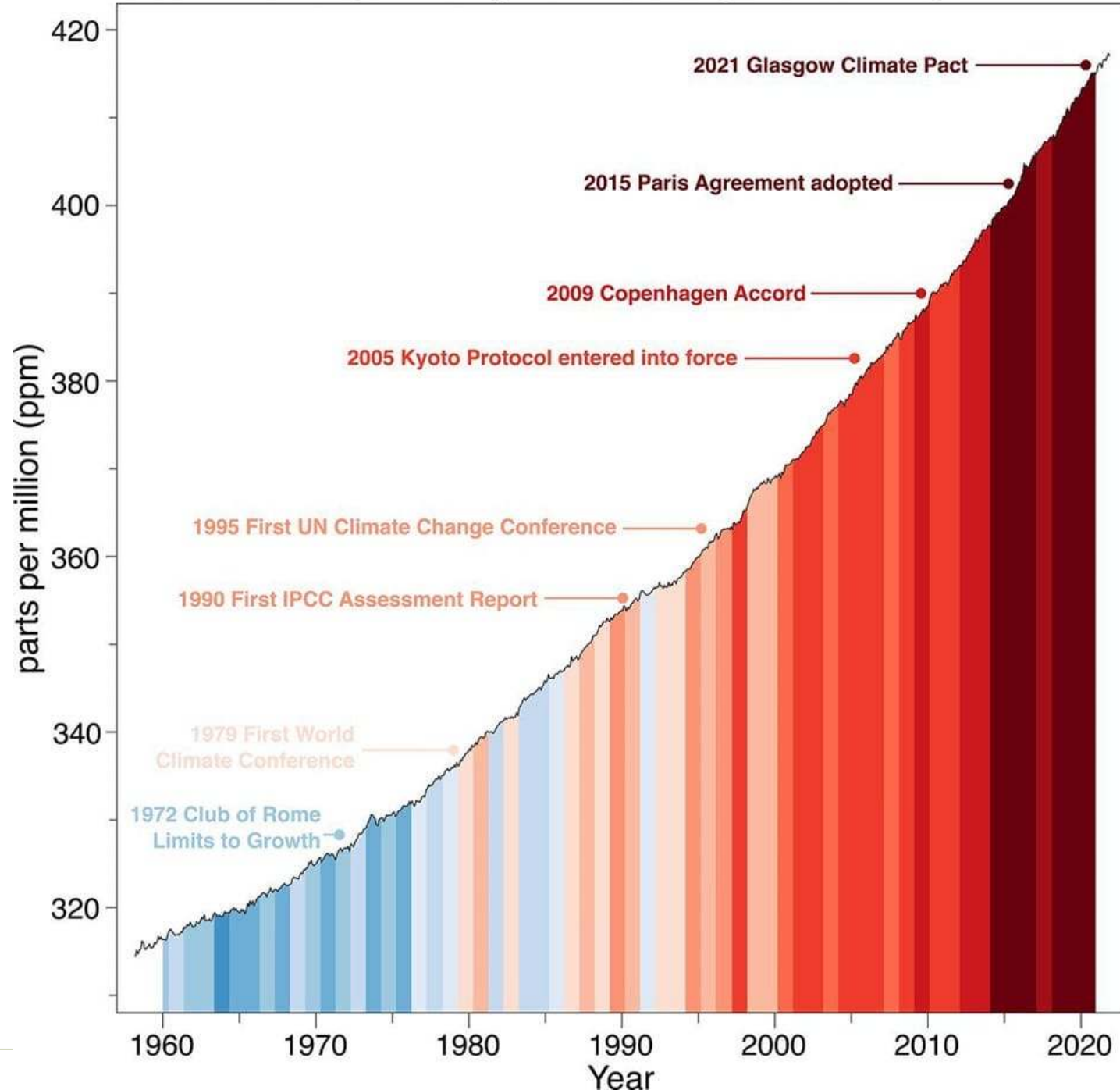
CO₂ emissions trend by country, 1870-2019 (log scale)



Financial Times, 18.11.2019



Trends in Atmospheric CO₂ vs Global Temperature Change







No.

There's hope.



"We are as gods and might as well get good at it"


-- Whole Earth Catalog, 1968



We can fix this.



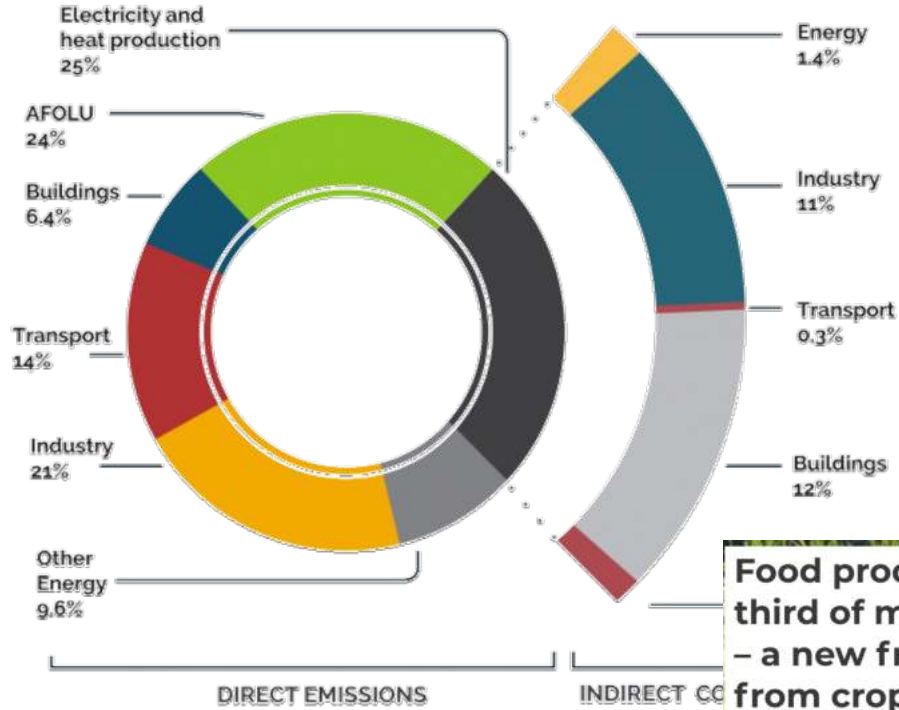


- 
- **30%** of global GHG emissions
 - **50%** of global employment
 - **66%** of global land use
 - **75%** of global freshwater use

But less than 5 % of global GDP.



Food system GHG emissions



Food production generates more than a third of manmade greenhouse gas emission – a new framework tells us how much come from crops, countries and regions

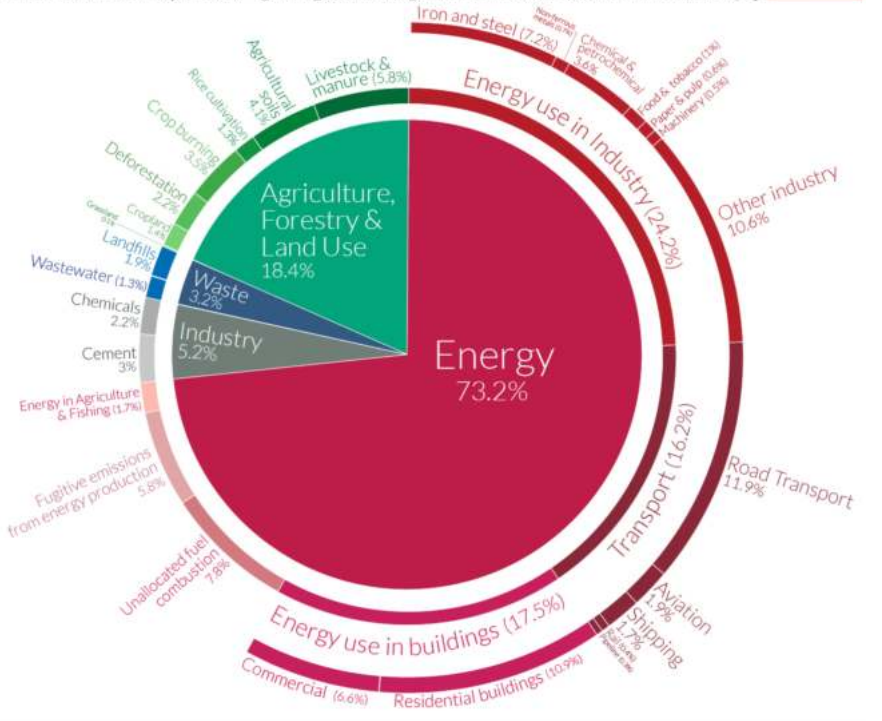


Producing enough food for a growing world population is an **urgent global challenge**. And it's complicated by the fact that climate change is warming the Earth and **making farming harder in many places**.

Food production is a big contributor to climate change, so it's critically important to be able to measure greenhouse gas emissions from the food sector accurately. In a **new study**, we show that the food system generates about **35% of total global man-made greenhouse gas emissions**.

Global greenhouse gas emissions by sector

This is shown for the year 2016 – global greenhouse gas emissions were 49.4 billion tonnes CO₂e.



OurWorldinData.org – Research and data to make progress against the world's largest problems. Source: Climate Watch, the World Resources Institute (2020). Licensed under CC-BY by the author Hannah Ritchie. (2020).

IPCC AR5 (2014)





The management of

Trees



Livestock





Silvopastoral:

Trees and livestock





Silvoarable:

Trees and crops





Polycultures:

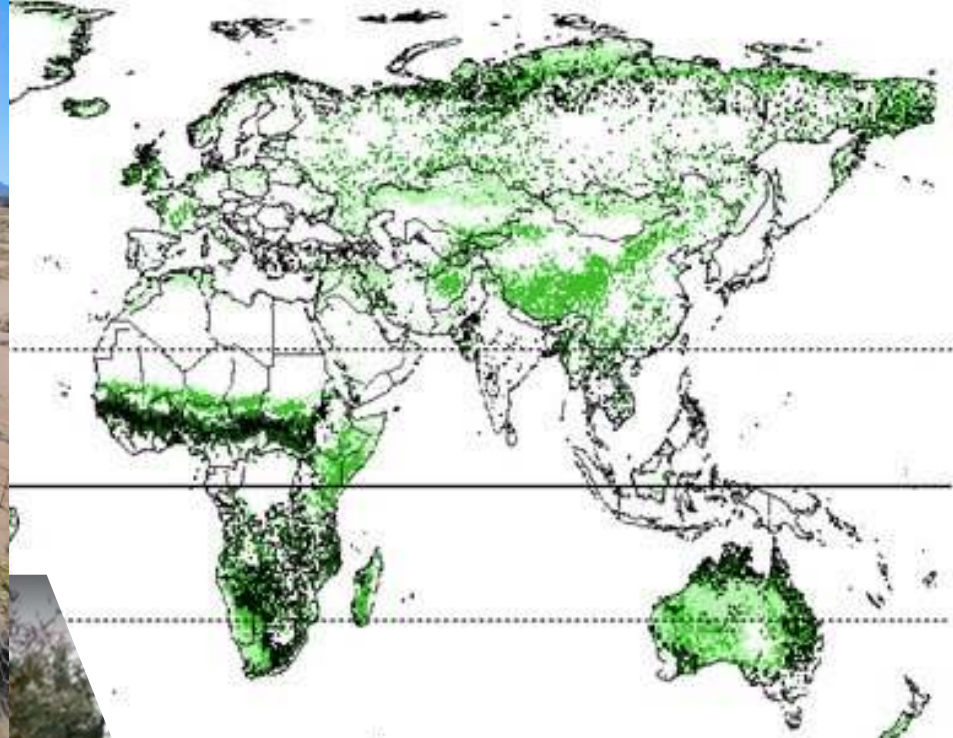
*Many trees, many crops,
sometimes many kinds
of livestock (from bees
and snails up)*





Grasslands:

Reproduce the impacts on the land of the predator-prey relationship





Silvopastoral:

Trees and livestock





Netherlands

*Poultry weed, fertilise
and control pests for the
apples.*

*The apples feed the
poultry and protect
them from raptors.*





Italy

The chickens weed, fertilise and control pests for the olives.

The olives feed the poultry and protect them from raptors.





Iberia

In these treed savannahs called dehesas (Spain) or montados (Portugal), the cork oaks and other trees feed the animals.

The animals suppress bush competition, thus lowering fire risks, and fertilise the trees.





Poland

Intensive pulsed grazing increases biomass productivity, benefiting the apple trees.

The apples provide shade and windbreak to the animals.





Burkina Faso

The livestock fertilise the shea and other trees and the crop fields.

The trees buffer droughts and rain storms for both crops and animals, and provide dry season tree fodder.





Germany

The trees shade the dairy cattle, boosting milk production.

The cattle fertilise the trees.





Belgium

The cattle eat nitrophilic plants, turning abandoned land into complex wooded pastures qualifying as Natura 2000 sites.





Sápmi

The trees host lichens and other winter fodder for the reindeer.

The reindeer fertilise the trees.







Czechia

Very thin soils – the apple trees were planted 60 yr ago in holes blasted in the bedrock with dynamite.





Silvoarable:

Trees and crops





France

Tree alleys buffer extreme weather, host pest predators and add organic matter to the soil.

Crops force tree roots deeper, helping them cope better with droughts.



Liagre F., personal communication



Belgium

Fruit trees reduce midday heat, furthering crop growth.

Crops mean root competition with the trees can be more exactly managed than with grasses.





Niger

Leguminous trees provide nitrogen and soil organic matter to the crops, firewood for the kitchen, and help rainwater percolate into the soil.





France:

The trees provide ecosystem services (distributed shade, rainfall buffering, pest control...) to the crops.

The crops force tree roots deeper, making them all resistance to storm throw.





Veneto, Italy

*Alfalfa/cereal rotation in
poplar/oak alleys.*





Niger

Fertiliser trees over the fields, fruit trees around the villages, crops and livestock under the trees.





Zambia

Faidherbia albida alleys
fertilize the maize





Nicaragua

Timber trees shade the coffee.





Sri Lanka

Leguminous gliricidia shrubs fertilise the coconut crop and provide woodfuel for the local biomass-to-energy plant





England

Wood fuel coppice of poplar, hazel etc. and crop rotation alleys





Polycultures:

*Many trees, many crops,
sometimes many kinds
of livestock (from bees
and snails up)*





Polycultures





Kenya

*Fodder trees, timber,
crops*





Uganda

*Coffee, papaya,
plantain, timber, bees,
chickens...*





Tanzania

Chagga gardens; timber, coffee, cocoa, banana, papaya, pepper, vanilla, honey, livestock, ground crops...





Brazil

Oil palm agroforestry





Uganda

Banana, coffee, vanilla...





Brazil

High-input agroforestry systems with vegetables, annual crops, fertilizer species, and native trees





Belize

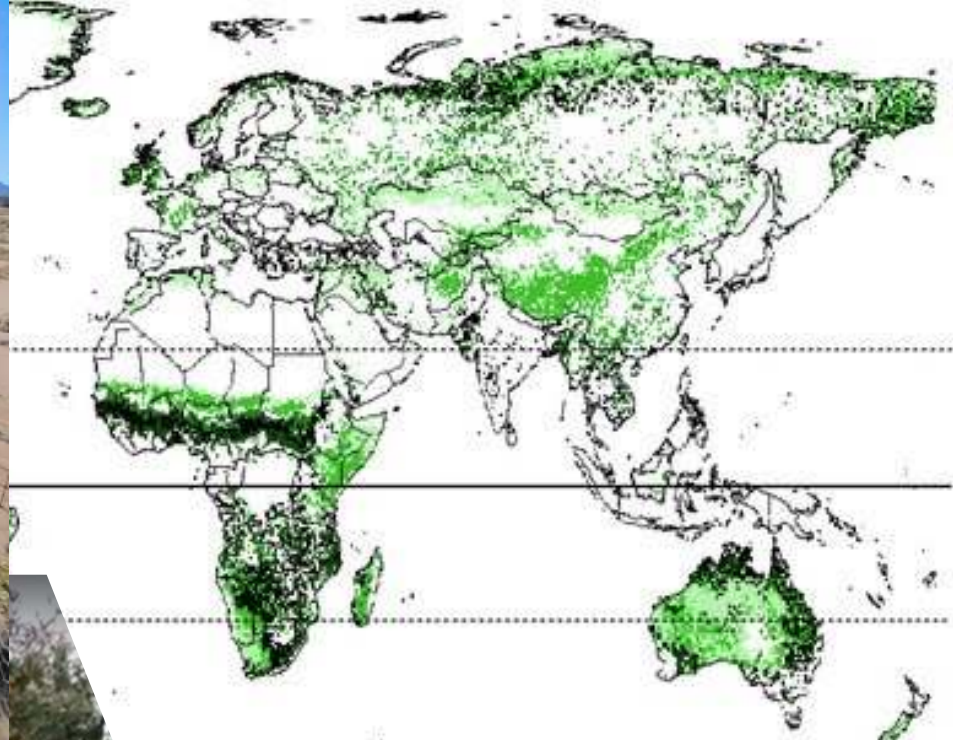
Timber, fruit trees, milpa





Grasslands:

Reproduce the impacts on the land of the predator-prey relationship



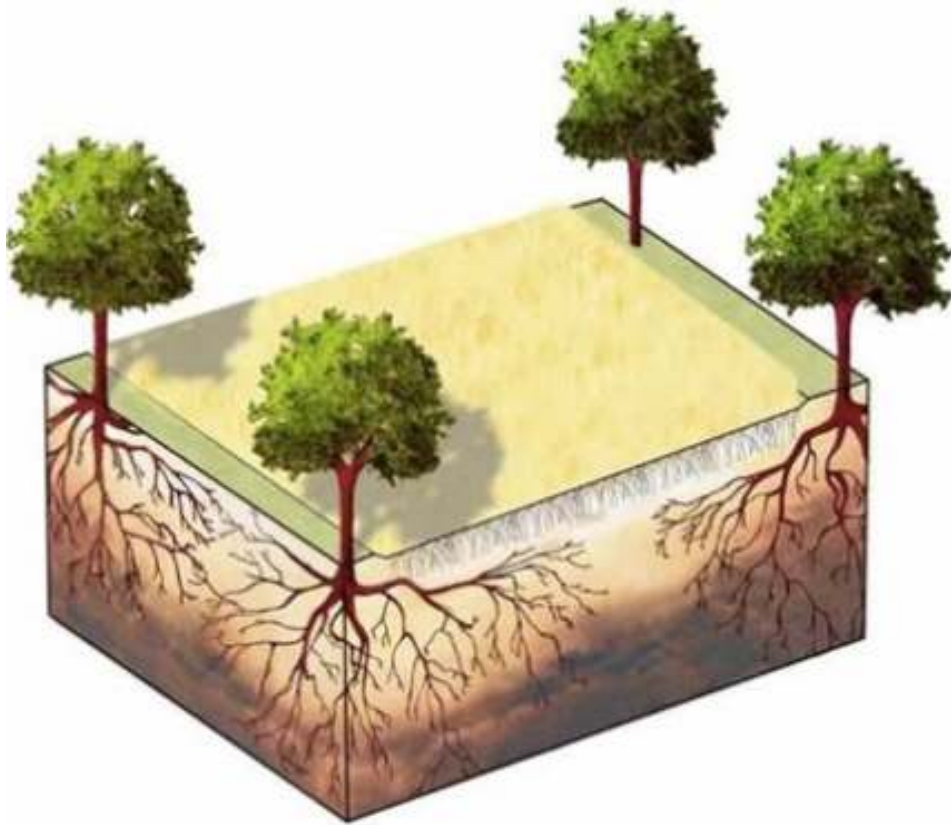


How do trees help?



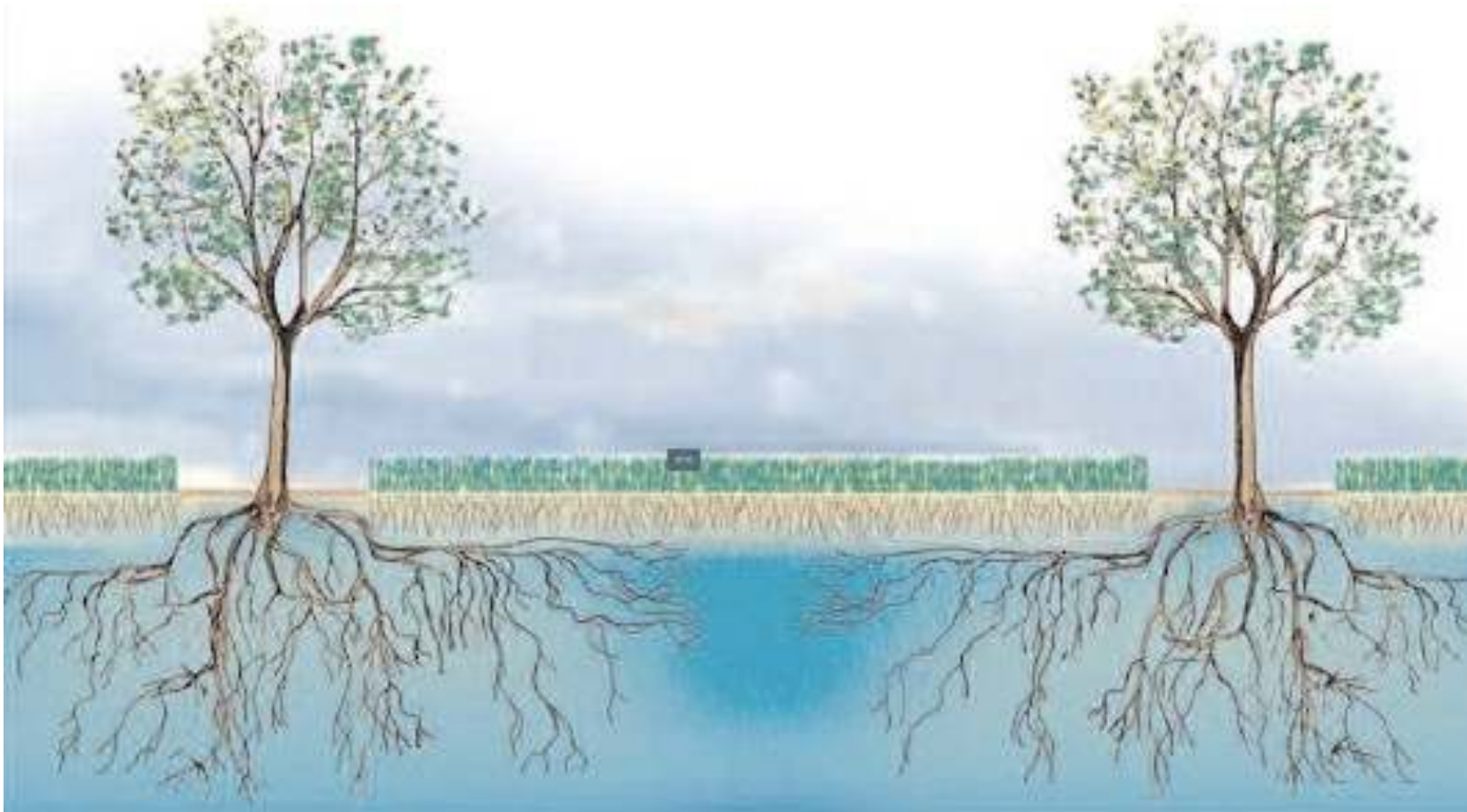


Nutrient cycling



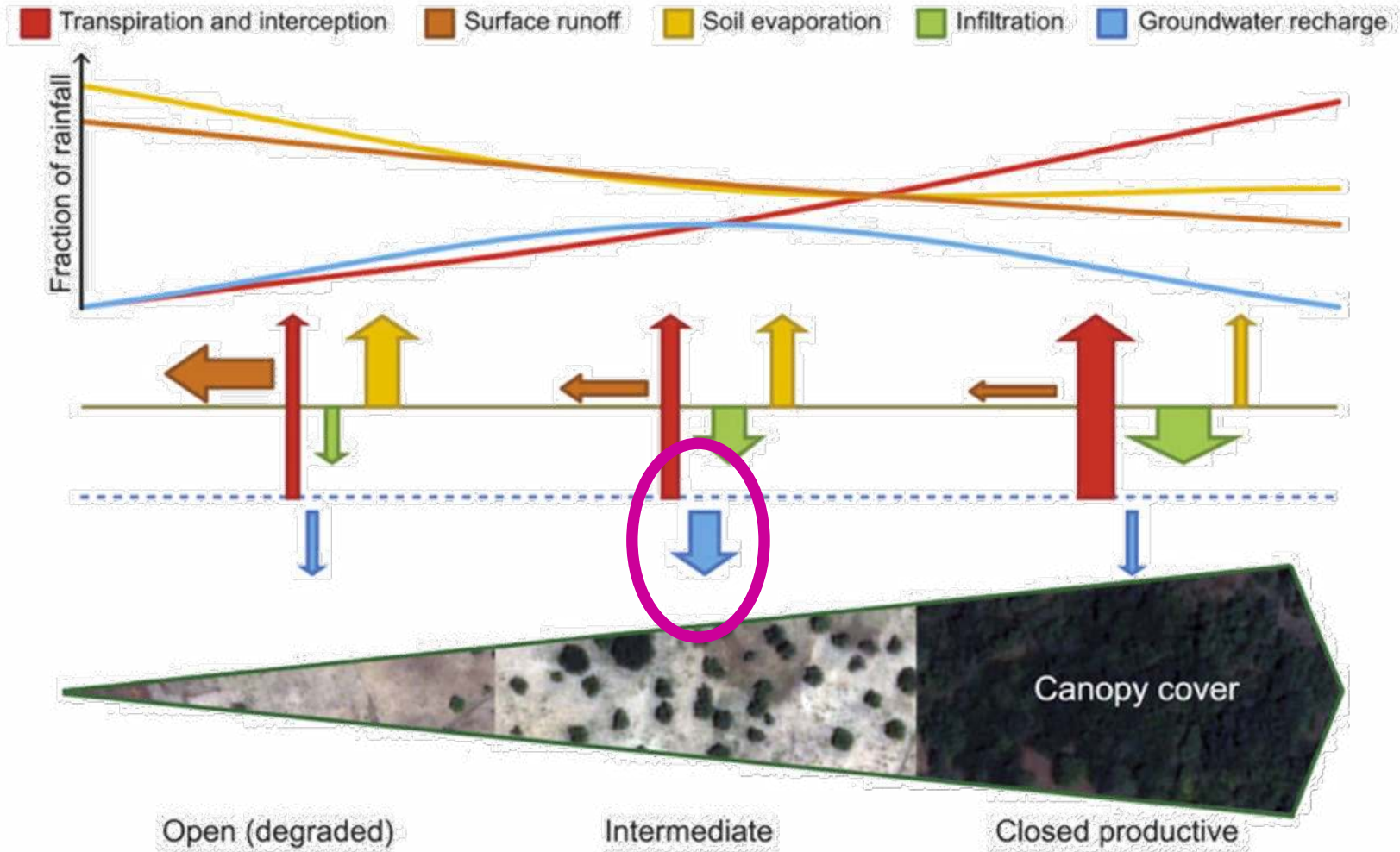


Water cycle buffering





Trees help water recharge

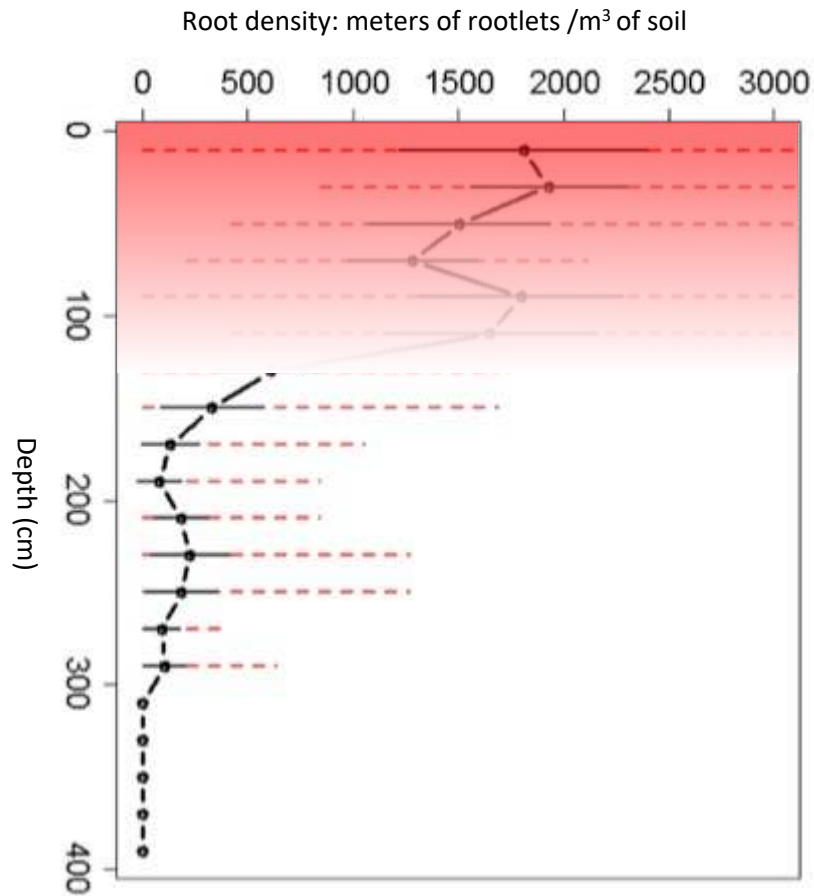


Ilstedt et al. (2016)

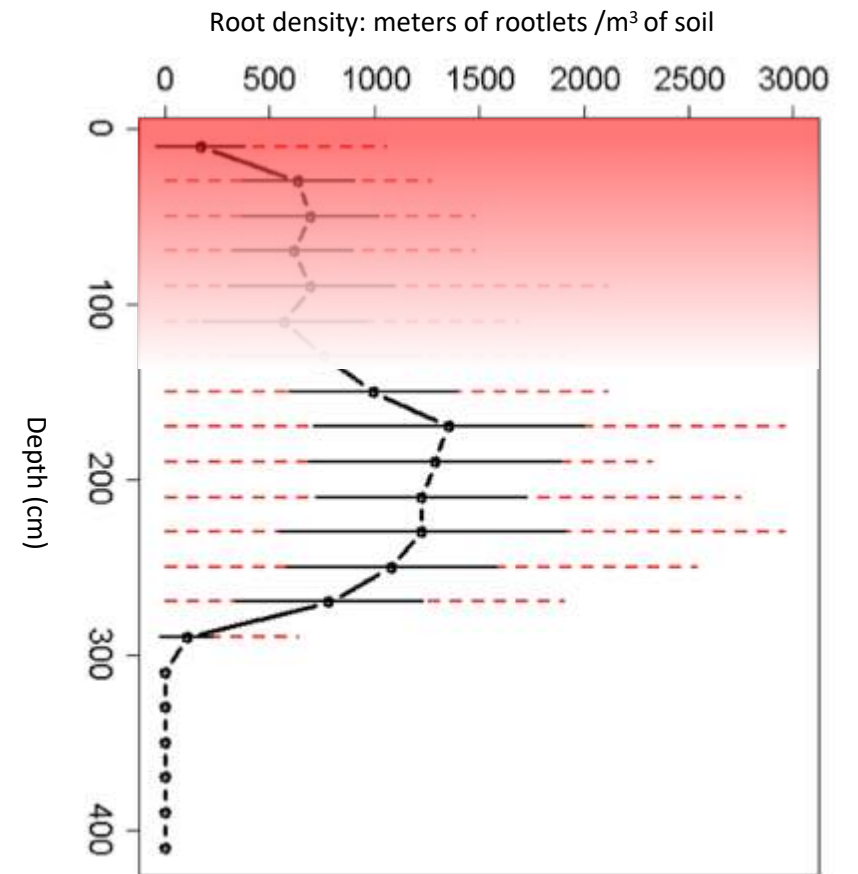


Rooting depths, forest vs. agroforestry

Forestry:
most roots close to surface



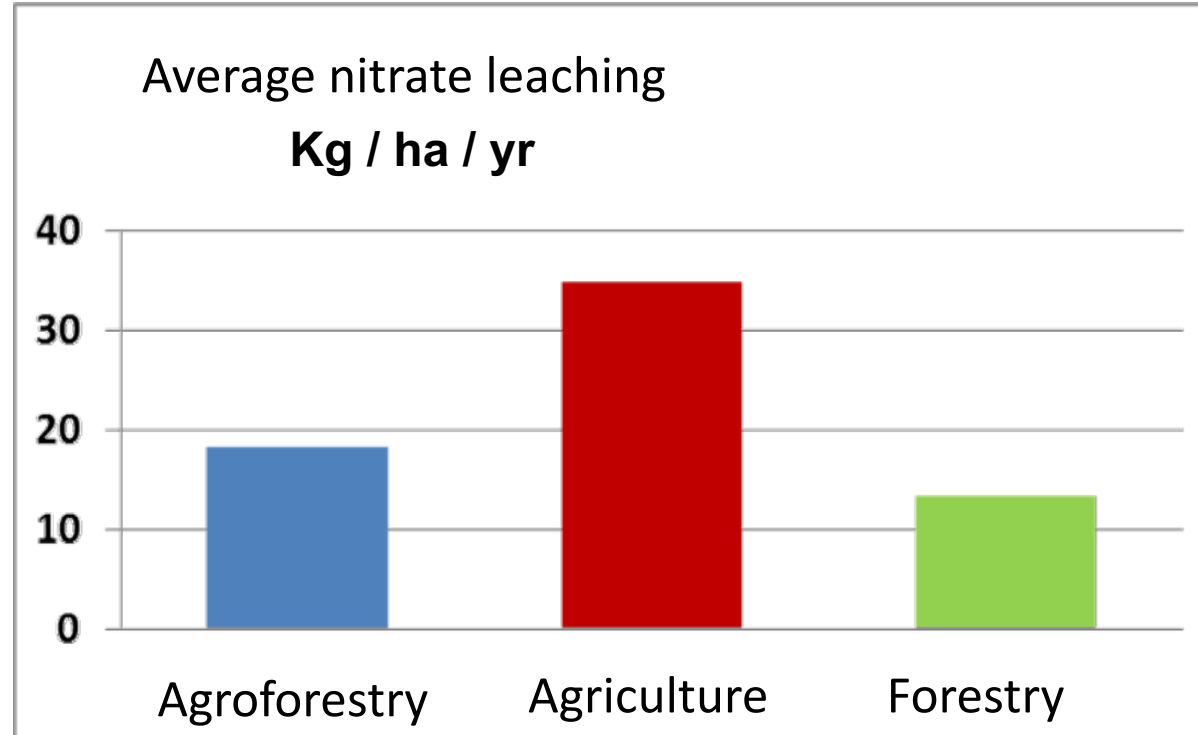
Agroforestry:
most roots at depth





Reduced nitrogen leaching

- Up to 50% less N lost under Agroforestry than arable
- Trees capture N not used by crops



Source : INRA Restinclières, France



Agroforestry and biodiversity

- Higher # of flora and fauna species (Birrer et al. 2007; Bailey et al. 2010 ; Lecq et al. 2017)
- Higher diversity and number of
 - Insects (Stamps and Linit 1998)
 - soil arthropods (Peng et al., 1993; Peng and Sutton, 1996, Pardon et al., 2018)
 - birds (Gillespie et al., 1995; Berges et al. , 2010)
 - pollinators (Sutter, 2017)
 - Butterflies (Varah et al., 2013)
- All that can improve the natural control of pests (Simon et al., 2011).

Higher biodiversity than agriculture or forestry
(Torralba et al., 2016, Udawatta et al., 2019)



Pest control



REVIEW

Effects of agroforestry on pest, disease and weed control: A meta-analysis

Lorena Pumariño^a, Gudeta Weldesemayat Sileshi^b, Sofia Gripenberg^c,
Riikka Kaartinen^a, Edmundo Barrios^b, Mary Nyawira Muchane^d,
Charles Midega^e, Mattias Jonsson^{a,*}

GfÖ

GfÖ Ecological Society of Germany
Austria and Switzerland

Basic and Applied Ecology xxx (2015) xxx–xxx

Basic and
Applied Ecology

www.elsevier.com/locate/baac

“Agroforestry practices resulted in lower abundances of both parasitic and non-parasitic weeds, and in higher abundances of natural enemies.”



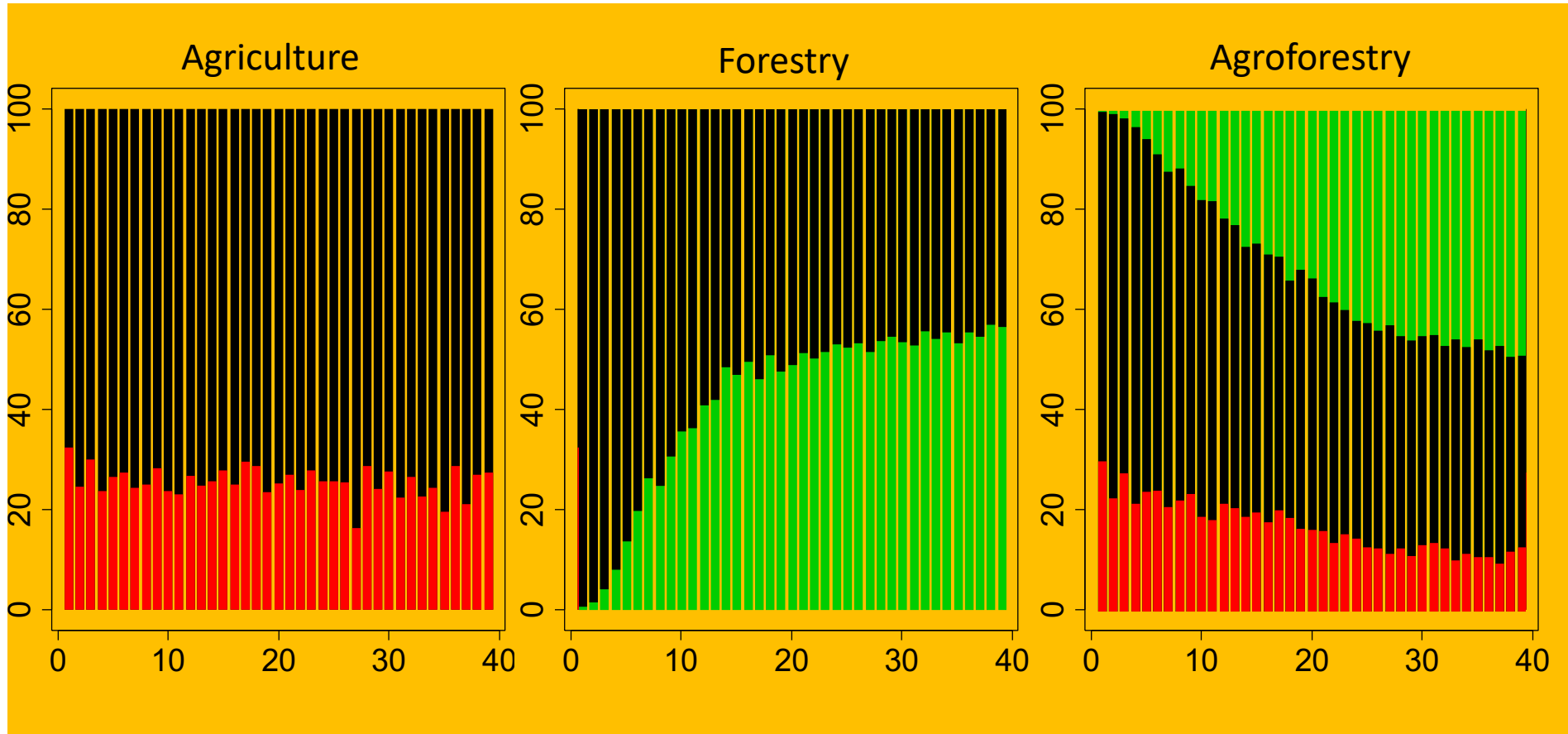
Late summer, *no photosynthesis!*

Late summer, *photosynthesis!*





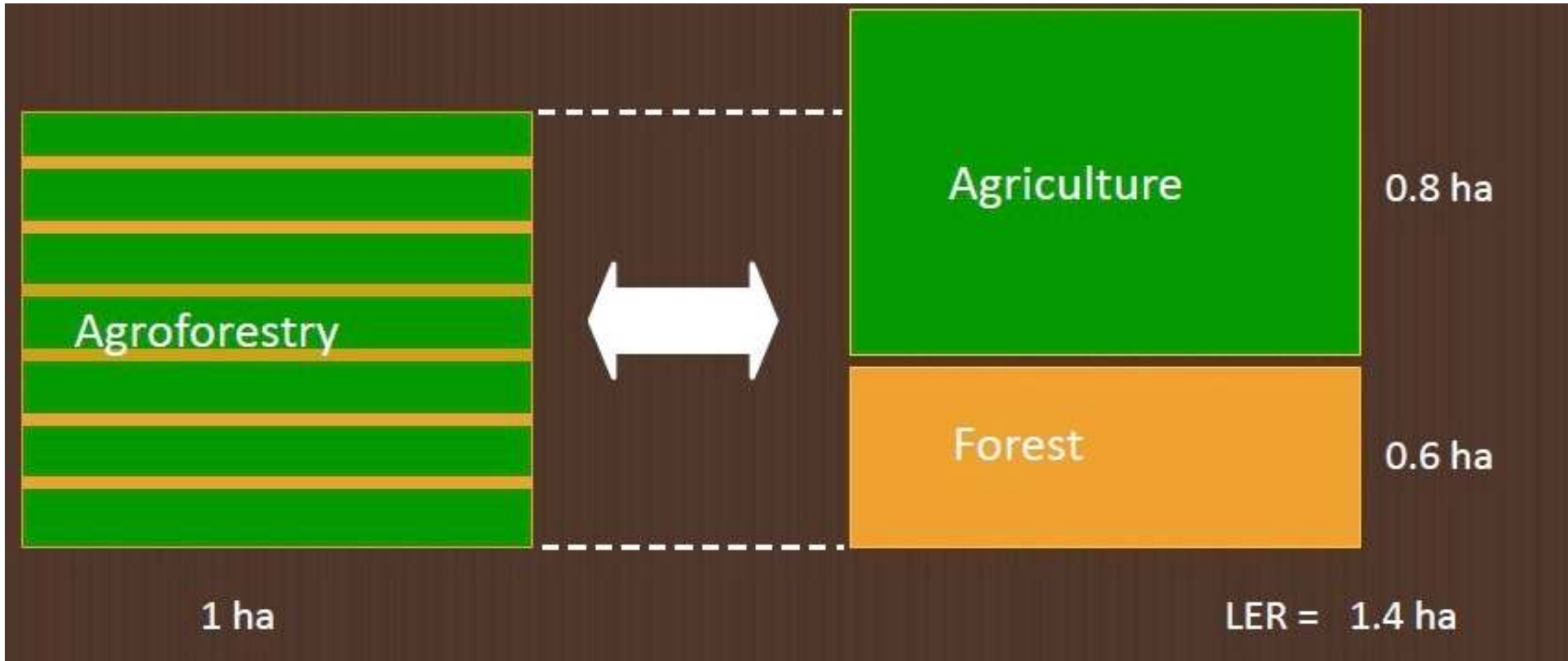
% of sunlight used by photosynthesis



- Walnut
- Wheat
- Not used



The Land Equivalency Ratio: measuring the profits





Willow alley cropping (Wakelyns, UK)





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	<i>Tree agroforestry yield</i>		<i>Crop or livestock agroforestry yield</i>	5.13
	8.33	<i>Tree monoculture yield</i>		<i>Crop or livestock monoculture yield</i>	5



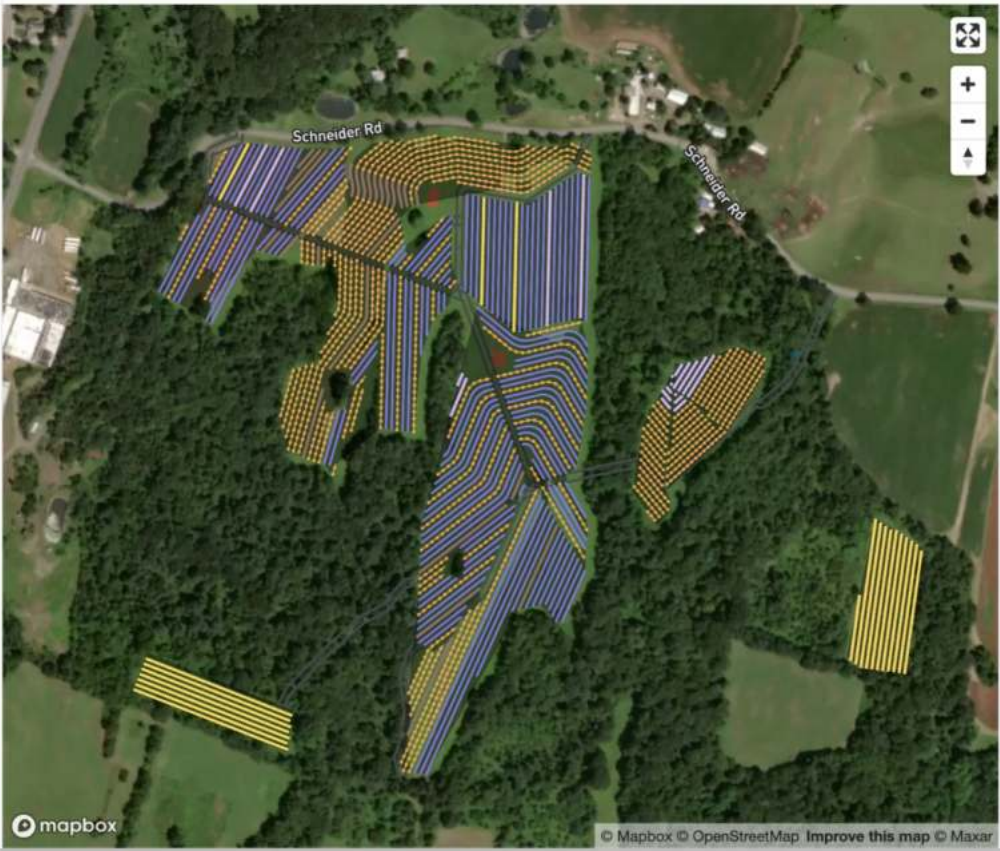
It works even on rented land

Whitehall farm, Cambs. (UK)

- 100 Ha cereal farm
- 15 year tenancy
- Fruit apple alleys set up
- 27 m alleys mean 24m cereal alleys (machinery) and 3m for pollinators
- Established to combat high wind erosion; boost biodiversity; use nutrients from deeper soil column; use more sunlight and water
- 92% of the area brings yearly crop income, 8% bring high fruit income



- Sections**
- > 1 Black Locust
 - > 1 Blackcurrant
 - > 1 Curly Poplar
 - > 2 Biodiversity
 - > 2 Chestnut
 - > 2 Cornelian Cherry
 - > 2 Elderberry
 - > 2 Jerusalem artichoke
 - > 2 Saskatoon
 - > 3 Biodiversity
 - > 3 Black Locust
 - > 3 Blackcurrant
 - > 3 Chestnut
 - > 3 Curly Poplar
 - > 4 Aronia
 - > 4 Biodiversity
 - > 4 Blackcurrant
 - > 4 Chestnut
 - > 4 Curly Poplar
 - > 4 Hazelnut
 - > 4 Seaberry
 - > 6 Blackcurrant
 - > 6 Chestnut
 - > 6 Willow



Sections

size	40.98 acres
qty	32 sections

Rows

size	87,095 row ft
qty	319 rows

Crops

- Curly Poplar

qty	2100
area	0.78 ac
- Chinese Chestnut

qty	1,486
area	15.86 ac
- Black Locust

qty	1,040
area	4.80 ac
- Blackcurrant

qty	15,181
area	17.61 ac
- Biodiversity Mix

qty	434
area	1.92 ac



- > Field 1.D
 - > Field 1.E
 - > Field 2.A
 - > Field 2.B
 - > Field 2.C
 - > Field 2.D
 - > Field 2.E
 - > Field 2.F
 - > Field 3.
 - > Field 4.A
 - > Field 4.B
 - > Field 5.A
 - > Field 5.B
 - > Field 5.C
 - > Field 6.D
 - > Field 6.E
 - > Gideon
 - > Mossbarger
 - > New Field 4
 - > Sleeping Giant
- Layers**
- Contours
 - Access
 - Headbands
 - Ridges
 - Valleys
 - Farm Boundary
 - Suitability



Deploy Share

Sections

size	87.79 acres
qty	27 sections

Rows

size	179,314 row ft
qty	608 rows

Crops

- Chinese Chestnut

qty	9,569
area	87.79 ac

Export

CSV ▾ lasting ▾

Export Kevin, Mayville - Fall 2022

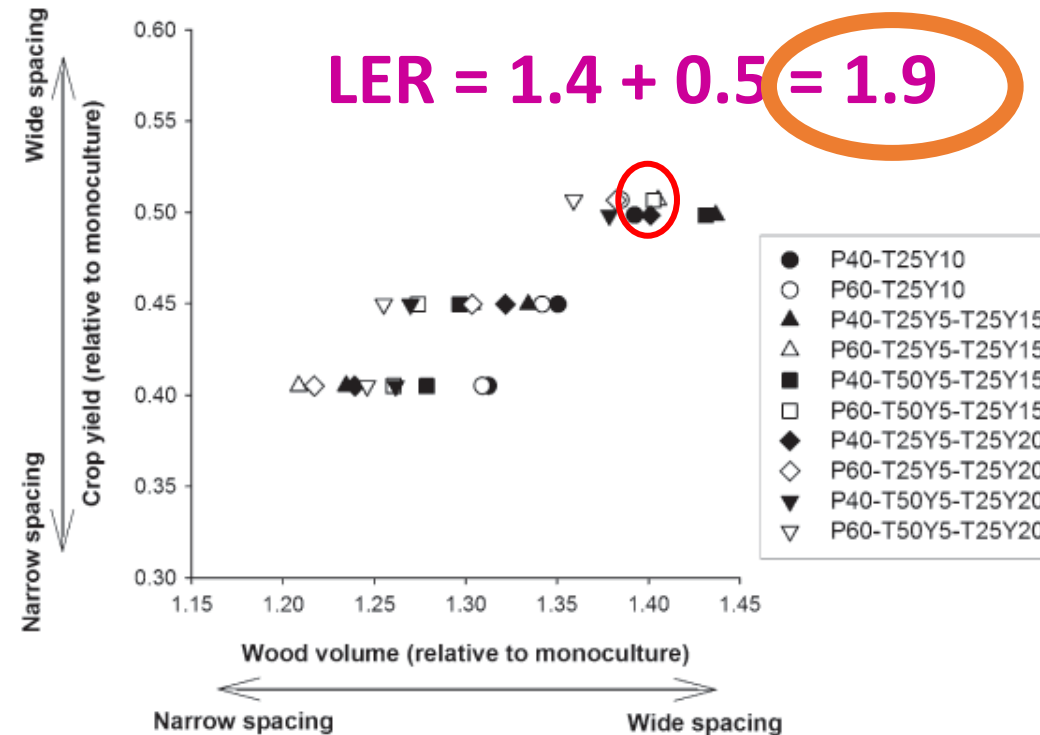


Teak & Maize

Intercropping teak (*Tectona grandis*) and maize (*Zea mays*): bioeconomic trade-off analysis of agroforestry management practices in Gunungkidul, West Java

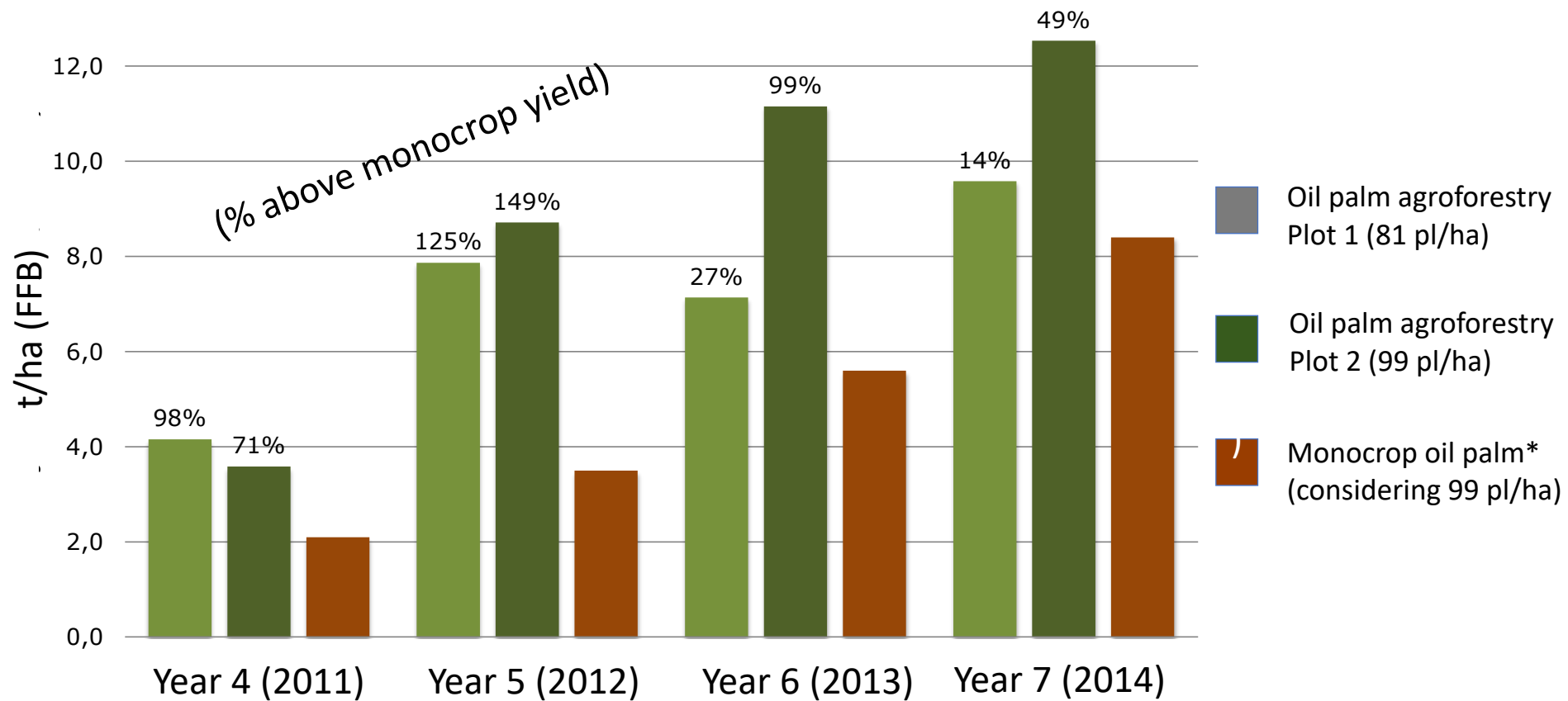
Ni'matul Khasanah · Aulia Perdana · Arif Rahmanullah · Gerhard Manurung · James M. Roshetko · Meine van Noordwijk

- Monoculture teak is not fertilized (not worth it).
- Maize is always fertilized
- Intercropping maize and teak (with best spacing + pruning + thinning) can get LER values up to 2.0.





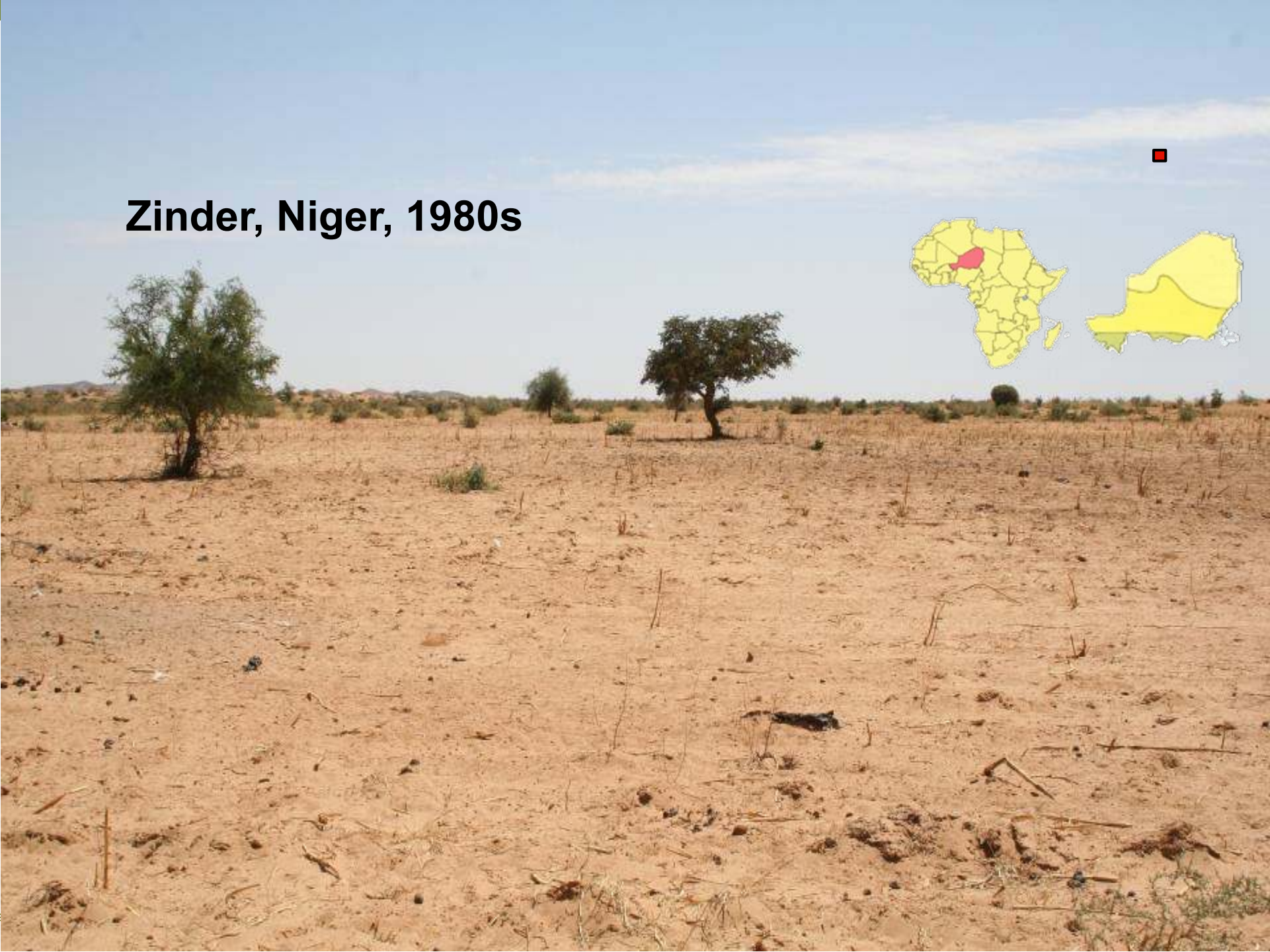
Oil palm agroforestry



*Average yields at the same age in the same region according to Perez et al. 2007
Viabilidade de extração de óleo de dendê no Estado do Pará. Viçosa, UFV. 2007.
http://portal.mda.gov.br/portal/saf/arquivos/view/biodisel/18_-_Dende.pdf



Zinder, Niger, 1980s





Zinder, Niger, today.

These 10 million hectares of new agroforest parklands are yielding

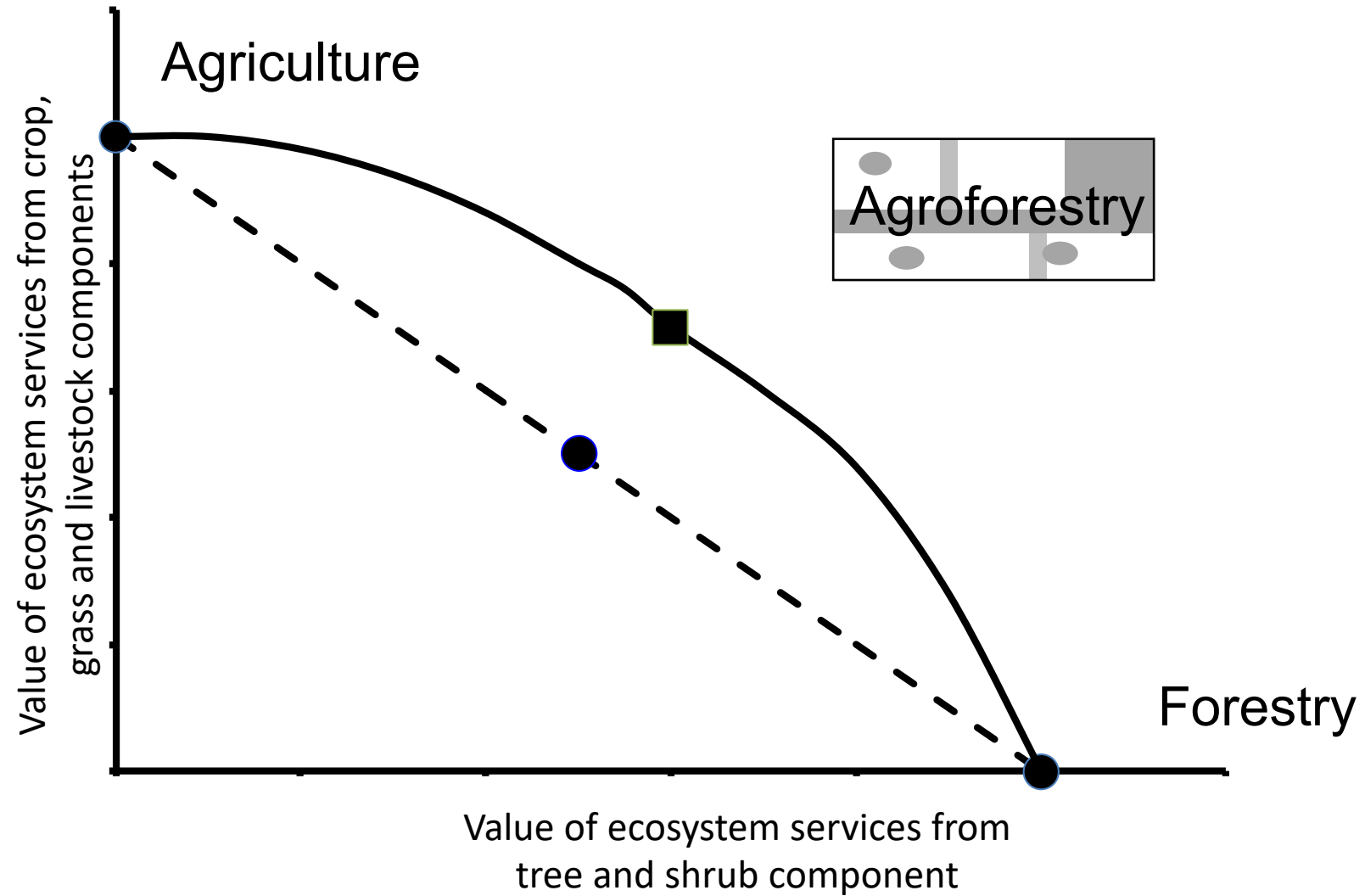
> 1,000,000 tonnes

more than before.

(Reij, 2012; Tappan, 2016)



Environmental LERs, too.





43% of all agricultural land has more than 10% tree cover.

That proportion is rising.

SCIENTIFIC REPORTS

OPEN

Global Tree Cover and Biomass Carbon on Agricultural Land: The contribution of agroforestry to global and national carbon budgets

Received: 14 April 2016

Accepted: 28 June 2016

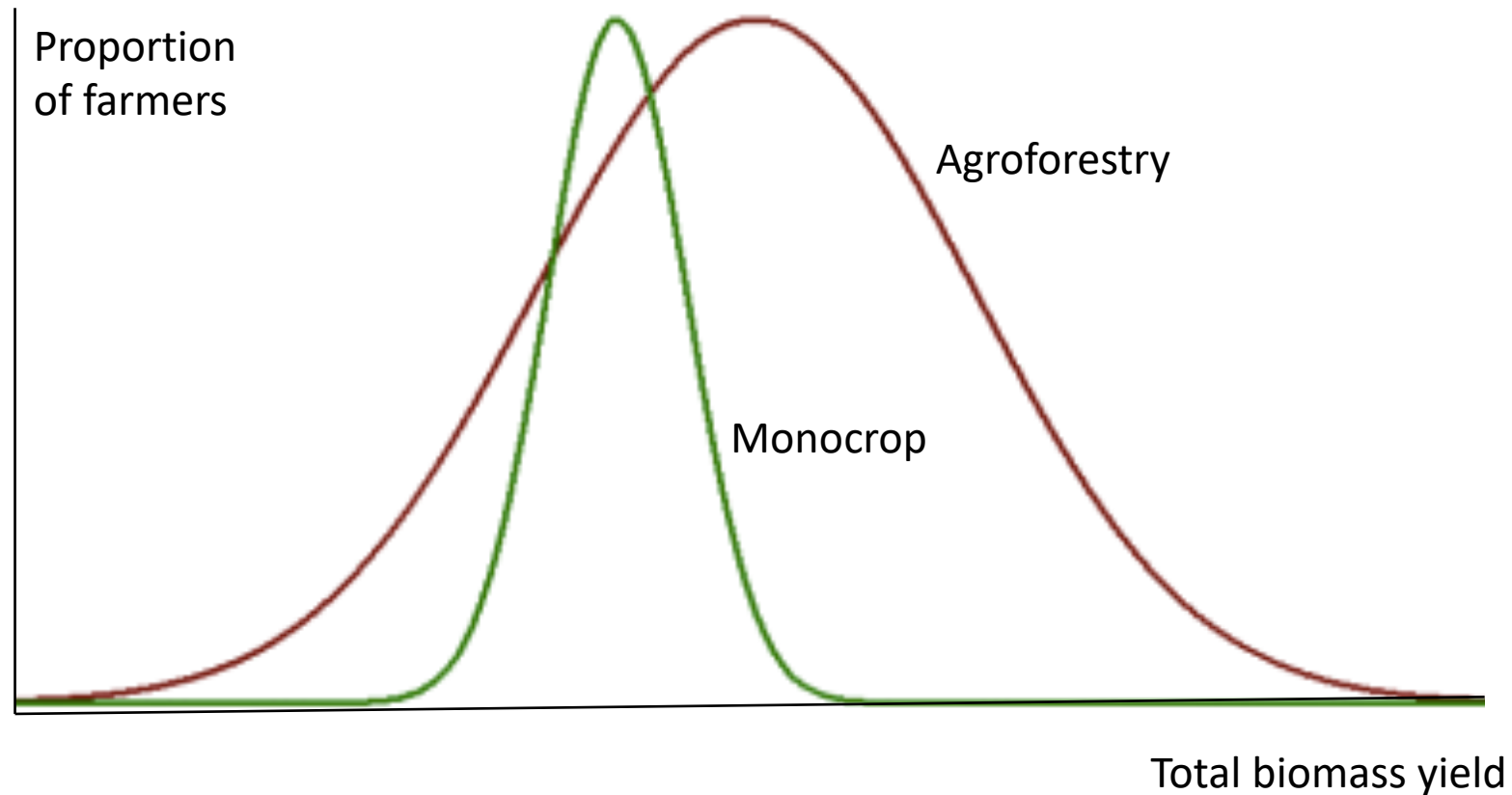
Published: 20 July 2016


Robert J. Zomer^{1,2}, Henry Neufeldt³, Jianchu Xu^{1,2}, Antje Ahrends⁴, Deborah Bossio⁵, Antonio Trabucco^{6,7}, Meine van Noordwijk^{8,9} & Mingcheng Wang¹

Agroforestry systems and tree cover on agricultural land make an important contribution to climate change mitigation, but are not systematically accounted for in either global carbon budgets or national carbon accounting. This paper assesses the role of trees on agricultural land and their significance for carbon sequestration at a global level, along with recent change trends. Remote sensing data show that in 2010, 43% of all agricultural land globally had at least 10% tree cover and that this has increased by 2% over the previous ten years. Combining geographically and bioclimatically stratified Intergovernmental Panel on Climate Change (IPCC) Tier 1 default estimates of carbon storage with this tree cover analysis, we estimated 45.3 PgC on agricultural land globally, with trees contributing >75%. Between 2000 and 2010 tree cover increased by 3.7%, resulting in an increase of >2 PgC (or 4.6%) of biomass carbon. On average, globally, biomass carbon increased from 20.4 to 21.4 tC ha⁻¹. Regional and country-level variation in stocks and trends were mapped and tabulated globally, and for all



The key agroforestry input: skill.



An aerial photograph of a vast agricultural landscape, showing a grid of rectangular fields in various shades of green and brown. A semi-transparent green circle highlights a specific area in the center-right of the image. The text "The essential enabling factor:" is overlaid in white on this green circle.

The essential
enabling factor:

Khleborobnoye
Хлеборобное

An aerial photograph of a vast agricultural landscape, showing a grid of rectangular fields in various shades of green and brown. A prominent green circular highlight is centered on the image, overlapping several fields. The word "Governance." is written in white text across the center of this green circle.

Governance.

Khleborobnoye
Хлеборобное

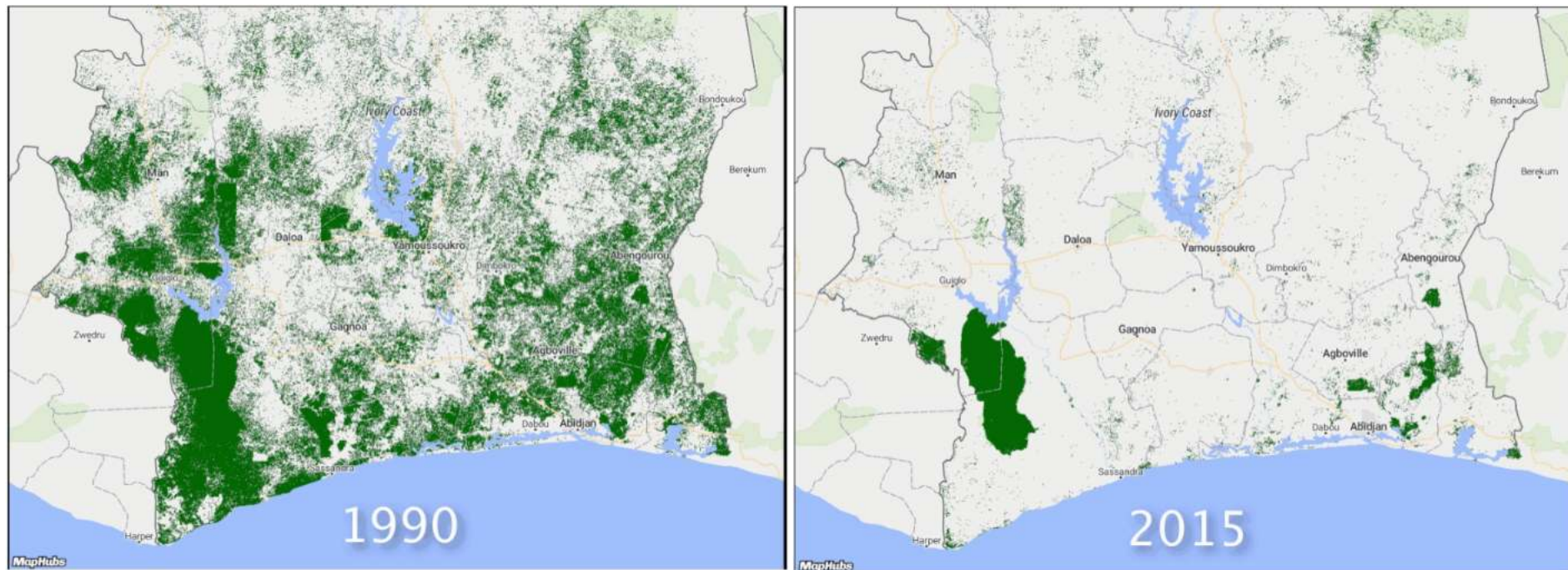


Khleborobnoye
Хлеборобное



Forestry code in Côte d'Ivoire

Regenerated farmers' trees belong to the government. Penalties for deforestation are scant.







Tigray, Ethiopia, 1980s







Tigray, Ethiopia, 2019







Galma, Niger

Changing forestry codes

1975

2003







In the EU, agroforestry has a simple and flexible definition: *“a land use system in which trees are grown in combination with agriculture on the same land”* (Reg 1305/2013). This definition is complemented by Article 4 of the EURAF Constitution: *“Agroforestry practices include all forms of association of trees and crops (silvoarable systems) and/or animals (silvopastoral systems), on a parcel of agricultural land, whether in the interior of the parcel or on its edges (hedges)”*.

Tree location	Agroforestry System	Agroforestry Practice	
		Agricultural Land	Forest Land
In parcels	Silvopastoral	1 Wood pasture	9 Forest grazing
	Silvoarable	2 Tree alley cropping 3 Coppice alley cropping 4 Multi-layer gardens	10 Muilti-layer gardens
	Permanent crop	5 Orchard intercropping, 6 Orchard grazing.	
	Agro-silvo-pasture	7 Alternating cropping and grazing	
Between parcels	Landscape Features	8. Hedges, trees in groups, trees in lines, individual trees	
Settlements	Urban agroforestry	11 Homegardens, allotments, etc.	



Agroforestry

Animals

Biotechnology

Broadband

Conservation

Coronavirus

Data

Disaster Resource Center

Farming

Agroforestry is the intentional integration of trees and shrubs into crop and animal farming systems to create environmental, economic, and social benefits. It has been practiced in the United States and around the world for centuries.

USDA Agroforestry Strategic Framework: Fiscal Year 2019-2024

The [agroforestry strategic framework](#) (PDF, 562 KB) is a roadmap for agroforestry services USDA provides to landowners through its numerous programs. As such, it plays a critical role in advancing agroforestry to enhance the nation's economy and its agricultural landscapes, watersheds, and communities.

Climate Change 2022

Impacts, Adaptation and Vulnerability

Summary for Policymakers



Future Adaptation Options and their Feasibility - SPM.C.2.2

Agroecological principles and practices and other approaches that work with natural processes **support food security, nutrition, health and well-being, livelihoods and biodiversity, sustainability and ecosystem services** (high confidence).

These services include pest control, pollination, buffering of temperature extremes, and carbon sequestration and storage (high confidence).

Their potential effectiveness varies by socio-economic context, ecosystem zone, species combinations and institutional support (medium confidence).

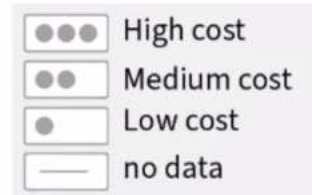
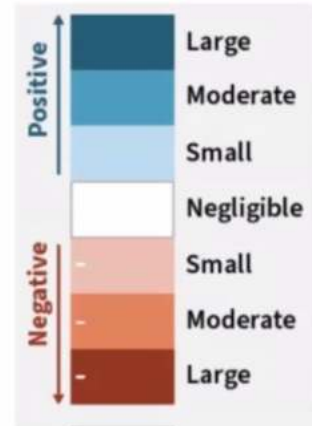
Integrated, multi-sectoral solutions that address social inequities and differentiate responses based on climate risk and local situation will enhance food security and nutrition (high confidence).

https://report.ipcc.ch/ar6wg2/pdf/IPCC_AR6_WGII_SummaryForPolicymakers.pdf



IPCC – Special report on CC and land

Response options based on land management		Mitigation	Adaptation	Desertification	Land Degradation	Food Security	Cost
Agriculture	Increased food productivity	L	M	L	M	H	—
	Agro-forestry	M	M	M	M	L	●
	Improved cropland management	M	L	L	L	L	●●
	Improved livestock management	M	L	L	L	L	●●●
	Agricultural diversification	L	L	L	M	L	●
	Improved grazing land management	M	L	L	L	L	—
	Integrated water management	L	L	L	L	L	●●
	Reduced grassland conversion to cropland	L	—	L	L	L	●
Forests	Forest management	M	L	L	L	L	●●
	Reduced deforestation and forest degradation	H	L	L	L	L	●●
Soils	Increased soil organic carbon content	H	L	M	M	L	●●
	Reduced soil erosion	↔ L	L	M	M	L	●●
	Reduced soil salinization	—	L	L	L	L	●●
Other ecosystems	Reduced soil compaction	—	L	—	L	L	●
	Fire management	M	M	M	M	L	●
	Reduced landslides and natural hazards	L	L	L	L	L	—
	Reduced pollution including acidification	↔ M	M	L	L	L	—
	Restoration & reduced conversion of peatlands	M	—	na	M	L	●





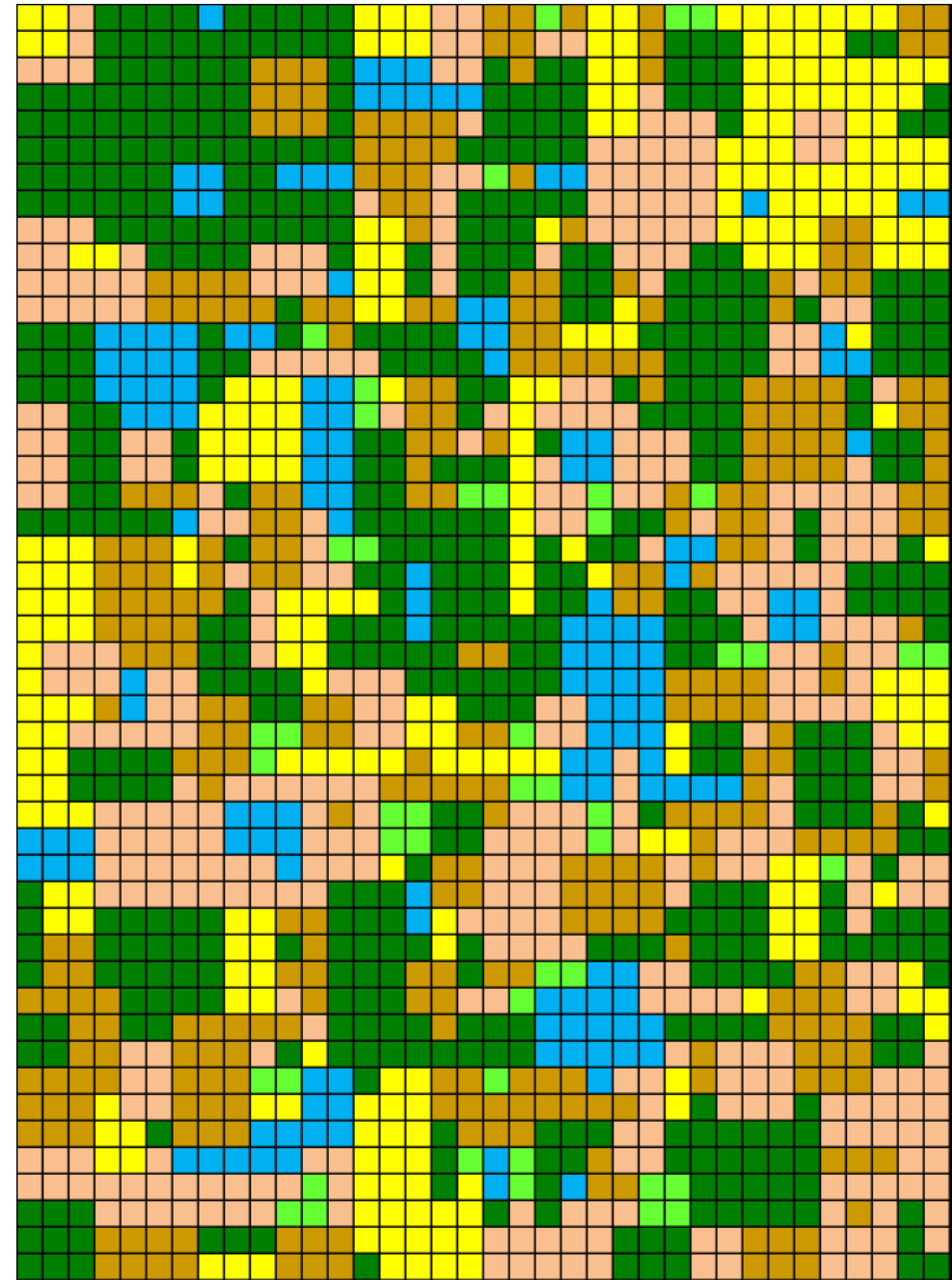
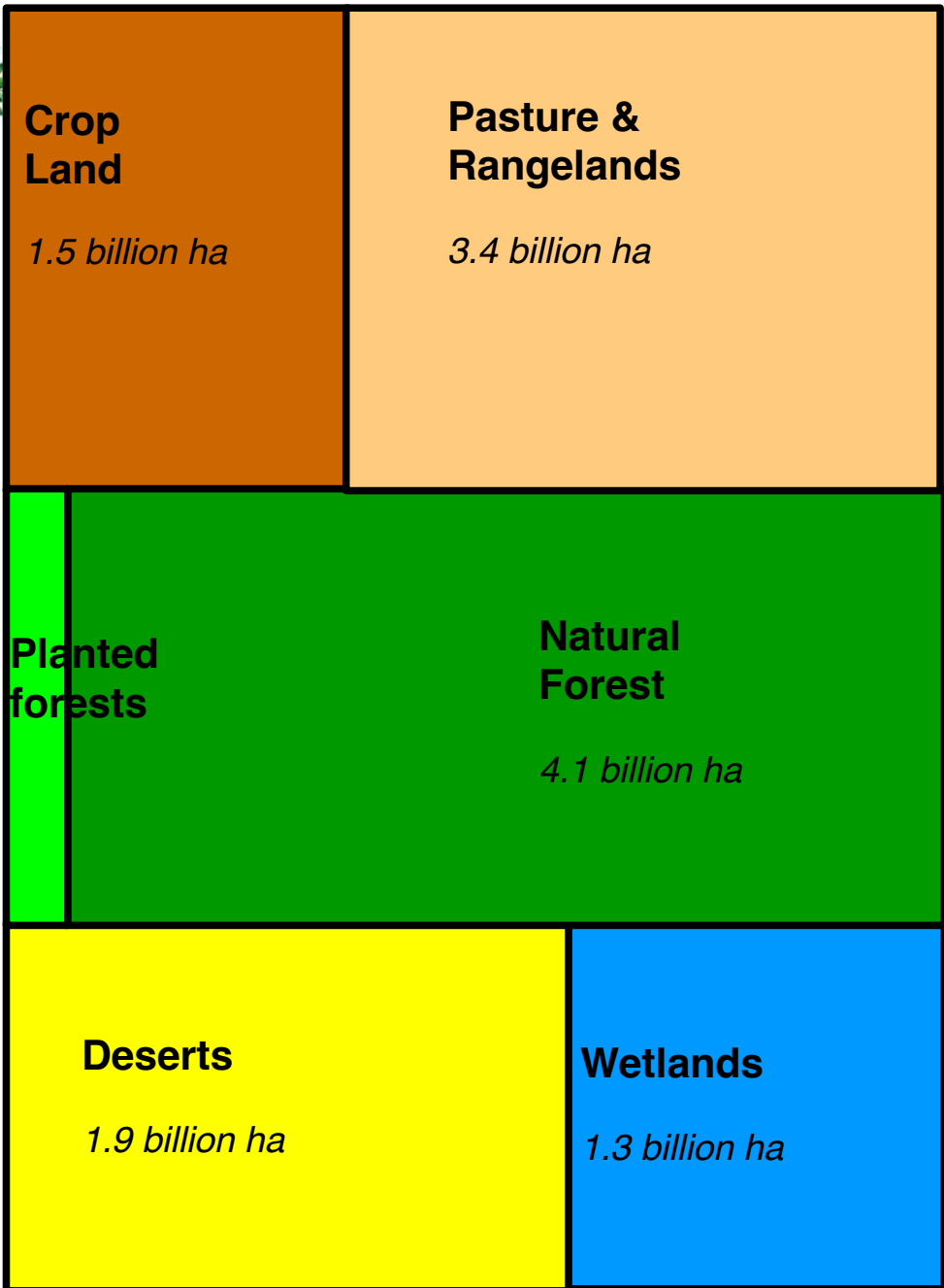
If this is the
future...





... why does the world
tend to this?







2 Agroforestry in CAP Strategic Plans (definitions)

Country	AF Definition (See Section 4.1.2.1 of each CAP Strategic Plan)
Austria	Agroforestry can be traditional systems as well as GAEC Landscape Features including scattered trees and multi-use rows or groups of trees on arable land. Agroforestry elements may also be present in permanent crops and permanent grassland.
Belgium-Flanders	Systems where trees are combined with agriculture on the same land. Arable land: a) minimum of 30 trees/hectare; b) a max of 200 trees/ha; c) homogeneous distribution of trees over the plot. Parcels planted with Pillar II premiums can have higher densities. Permanent cropland and permanent grassland have the same thresholds.
Belgium-Wallonia	A set of land use systems that combine forestry and agricultural activity on the same land. Forestry means the production of wood or other non-agricultural products from trees. Trees on agricultural land may consist of tree rows, tree-groups and isolated trees. On arable land, the tree density is between 30 and 100 trees inclusive. A minimum diameter of trees will be set at 1.2 metres. To be recognised as part of an agroforestry system, the trees must be of a species adapted to the local climate and soil conditions of the location. Agroforestry is specifically mentioned in GAEC-8. Short rotation coppice is taken into account on permanent cropland. On permanent grassland, the density of an agroforestry plantation will also be fixed at 30-100 trees per ha, whether aligned in rows or not, with a minimum tree diameter to be measured at 1.2m high.
Bulgaria	Arable land: a) Tree species / mosaic, scattered and /or those in a line/, perpendicular to the slope and the prevailing wind; b) Shrubby vegetation; c) Multifunctional buffer strips (medicinal, essential, leguminous, meadow-grass species). Permanent crops: a) Multifunctional buffer strips / medicinal, essential, leguminous, meadow-grass species; b) Fruit species grafted on low-growing rootstocks and bearing fruit early in the inter-row; space, medicinal, essential oil, etc. c) Shrubby vegetation perpendicular to the slope and prevailing winds. Permanent grassland; a) Single /mosaic trees/ or trees in a group - linear - Silvopasture; Shrubs strips; Coastal buffer strips of perennial vegetation (trees/shrubs/grasses)
Croatia	The Croatian CSP Section 4.1.2.1 defines "Elements of agroforestry systems when it is established and/or maintained on the agricultural area" and states that on arable land - AF includes single row windbreaks dominated by tall trees of acceptable native species; on permanent crop land it is considered that establishment of agroforestry systems would not lead to an increased effect of sustainable management and does not represent a common traditional practice; on permanent pastures up to and including 50 individual scattered trees per hectare are permitted.
Cyprus	Section of 4.1.2.1 indicates that agroforestry systems are planted or maintained on agricultural land. On arable land agroforestry is the cultivation of forest trees and agricultural crops in the same field, when the forest and agricultural species may grow over the whole area of the plot or peripherally with spatial separation, such as windbreaks with cypress trees. In permanent crops agroforestry is the cultivation of forest trees and permanent crops on the same plot. In permanent pasture it is a wood pasture system which combines the presence of forest trees and grassland plants and animals on the same plot - these occur mainly in the semi-mountainous zone and are natural ecosystems of Mediterranean shrublands and eastern heathlands. No tree-density limit is provided.
Czechia	Silvoarable systems - arable land on which linear tree planting of a maximum of 100 trees is provided trees/has been established in accordance with Regulation (EU) 2021/2115 of the European Parliament and of the Council. Permanent crops - agroforestry systems are not proposed permanent crops where there would be no increased effect of sustainable management. Agroforestry within permanent crops would also be problematic in terms of administratively and legislatively, especially in relation to the definitions of crops in national legislation. When planting more than 100 trees per hectare, it is an orchard culture. Silvopastoral systems - permanent grassland on which linear, scattered or grouped grassland occurs tree planting with a maximum of 100 trees/ha established in accordance with Regulation of the European Parliament and Council Regulation (EU) 2021/2115.
Denmark	Some types of agroforestry are eligible. Eligible agroforestry is defined as areas in rotation on which fruit, berries or nuts are grown in combination with at least one other crop, not coppice species. Other ineligible trees and shrubs (scattered trees, clusters and hedgerows) on eligible areas are included in the 20 per cent permitted small habitats on the areas pursuant to compliance with the activity requirement.
Estonia	On arable land an agroforestry system is defined as an area where trees (except Christmas trees) are grown in rows and the spacing between trees is in rows of no more than 10 metres and under which agricultural crops, grassland crops and forest trees are grown. The same spacing conditions are mentioned for permanent grassland where grasses and natural herbaceous plants or grazing livestock are grown. Detailed conditions are to be laid down in national regulations. In areas of permanent crops with fruit trees and shrubs growing in rows agricultural crops, grassland crops and wild herbaceous crops or grazing livestock may be used, with detailed requirements laid down in a national regulation.
Finland	A windbreak planted as a narrow strip of trees and/or shrubs can be planted following the edge of a parcel and will be part of the eligible area for basic payments.

France	Land use systems and practices in which woody perennials are deliberately integrated with crops and/or grazed areas on the same management unit. Trees can be isolated, in rows or in groups within crop plots (intra-plot agroforestry) or meadows (parcours arboré) or on the boundaries between plots (hedges, rows of trees)". No indication is given of tree number thresholds.
Hungary	For arable land agroforestry is a mixture of arable crops (including temporary grassland) and forestry or fruit tree species with simultaneous intercropping of woody or fruit crops on the same area, and where the woody plants are grown in parallel rows or other regular geometric arrangement, and their number does not exceed 250 per hectare. Also included is a mix of arable crops and short-rotation coppice, where woody plants are grown in parallel rows or other regular geometrical arrangement and their number does not exceed 4000 per hectare. Detailed national rules for short rotation coppice energy crops shall also be respected in these agroforestry systems. The following permanent crops are considered to be agroforestry systems if they are independent objects and are not part of arable or grassland: a. field hedges, field hedge strips, groups of trees and shrubs, and other special special tree plantations (short rotation energy plantations and Christmas tree plantations) which meet the criteria for a landscape element under GAEC 8 and are therefore eligible for basic payment; b) productive plantations planted with a mixture of forestry and fruit tree species. Wooded pastures shall be considered as agroforestry systems where woody species are planted in parallel rows or other regular geometric pattern and where the number of trees does not exceed 250 per hectare. "Woody plants" plants shall mean forest tree species or fruit trees.
Germany	Woody plants of non-excluded species with the primary objective of raw material extraction or food production in accordance with a use concept verified as positive by the competent Länder authority or by an institution recognized by the Länder, in at least two strips covering no more than 40% of the agricultural area or scattered distribution over the area in a minimum number of 50 and no more than 200 such woody plants per hectare.
Greece	Agroforestry systems are systems with scattered trees or trees in rows, or on the margins of plots. They can be either forest trees (oaks, pines, poplars, cypresses) or fruit trees (citrus, apple and stone fruit trees, acacia trees), olives, carob and mastic trees). They can be combined with the cultivation of cereals, horticultural crops, fruit and vegetables and/or grazing. Trees, if planted in rows, should have a minimum distance of 10 metres between rows, the distance between trees in the same row should be greater than 4 metres. Trees may also be present at the boundaries of the field in the form of a living fence to protect the agricultural crop from the wind and to create a zone that will support wildlife. The maximum number of trees is 250 trees per hectare. Agroforestry also includes partially forested areas (sparse forests) of pasture with the tree cover up to 40% and understorey with herbaceous and woody vegetation. In this case the minimum tree density may be 5 trees/ha and the maximum 40 trees/ha trees/hectare depending on the slope, tree species and climatic conditions.
Ireland	Arable Land. The combination of arable land and forestry shall be deemed an agricultural area; a stocking rate of 400 - 1000 trees per hectare (equal spacing) is acceptable; a tree-to-tree width of 20 metres is required; acceptable broadleaf species will include oak, sycamore and cherry. Other species, including conifers can be considered on a site-by-site basis. Where a lower stocking density (i.e. <400 trees per hectare) the land will be classified as arable land. Permanent Crops. The combination of permanent crops and forestry shall be deemed an agricultural area. A stocking rate of 400 - 1000 trees per hectare (equal spacing) is acceptable. A tree-to-tree width of 20 metres is required. Acceptable broadleaf species will include oak, sycamore and cherry. Other species, including conifers can be considered on a site-by-site basis. Where a lower stocking density (i.e. <400 trees per hectare) the land will be classified as permanent crops. Permanent grassland. The combination of permanent grassland and forestry shall be deemed an agricultural area. A stocking rate of 400 - 1000 trees per hectare (equal spacing) is acceptable. A tree-to-tree width of 20 metres is required. Acceptable broadleaf species will include oak, sycamore and cherry. Other species, including conifers can be considered on a site-by-site basis. Grazing by sheep or young domestic stock is permitted during the spring and summer months for the first 6-8 years, depending on tree growth, but trees must be protected and tree shelters checked regularly. Thereafter, when tree shelters are replaced with plastic mesh, larger animals may be introduced. Fodder: Silage and hay production is permitted. It is important that appropriate machinery is used when cutting silage and/or hay so as to ensure that the trees are not inadvertently damaged. Where a lower stocking density (i.e. <400 trees per hectare) the land will be classified as permanent grassland.
Italy	Agroforestry systems comprise all agricultural systems in which the cultivation of perennial tree or shrub species of forest interest are combined with arable land, with the possible presence animal component on the same surface, with the aim of improving the sustainable use of the soil on which agricultural activities, with the possibility of diversifying farm production by providing valuable timber, biomass, non-wood secondary products such as truffles, cork, acorns, honey alongside to agricultural and livestock products. In cases where perennial tree and shrub species are present on arable land trees and shrubs of forest interest on arable land, these must have a density of no more than 250 plants per hectare, without the need to ensure the sustainability of agricultural use; in such cases, the eligible area shall not be subtracted from the eligible area. areas occupied by trees are not subtracted from the eligible area. These systems, excluded in the recent past by mechanisation and monoculture, have been rediscovered in modern production contexts for the undeniable advantages they offer to farms and the the environment, in terms of landscape, synergetic production increases, crop diversification improvement of the microclimate, increased biodiversity, control of nutrient leaching and erosion with the improvement of hydraulic regulation and water quality, improvement of other natural resources, with particular reference to habitats for wildlife, storage of carbon, etc. Agroforestry systems in Italy, thanks to the important




Cheap capex and opex.

Expensive labour.







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ХОЗЯЙСТВУ
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000000 ТРАКТОРОВ!





Agroecology cashflow: some consultancy

Agrobusiness cashflow:
regular sale of inputs

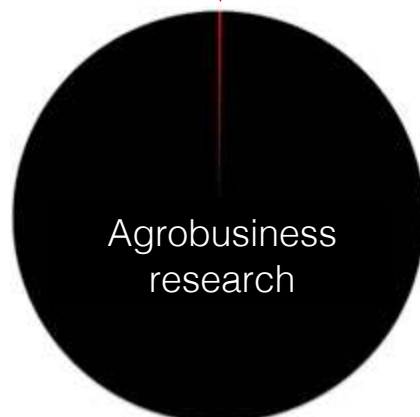


Agroecology
marketing budget



Agrobusiness
marketing

Agroecology
research budget



Agrobusiness
research

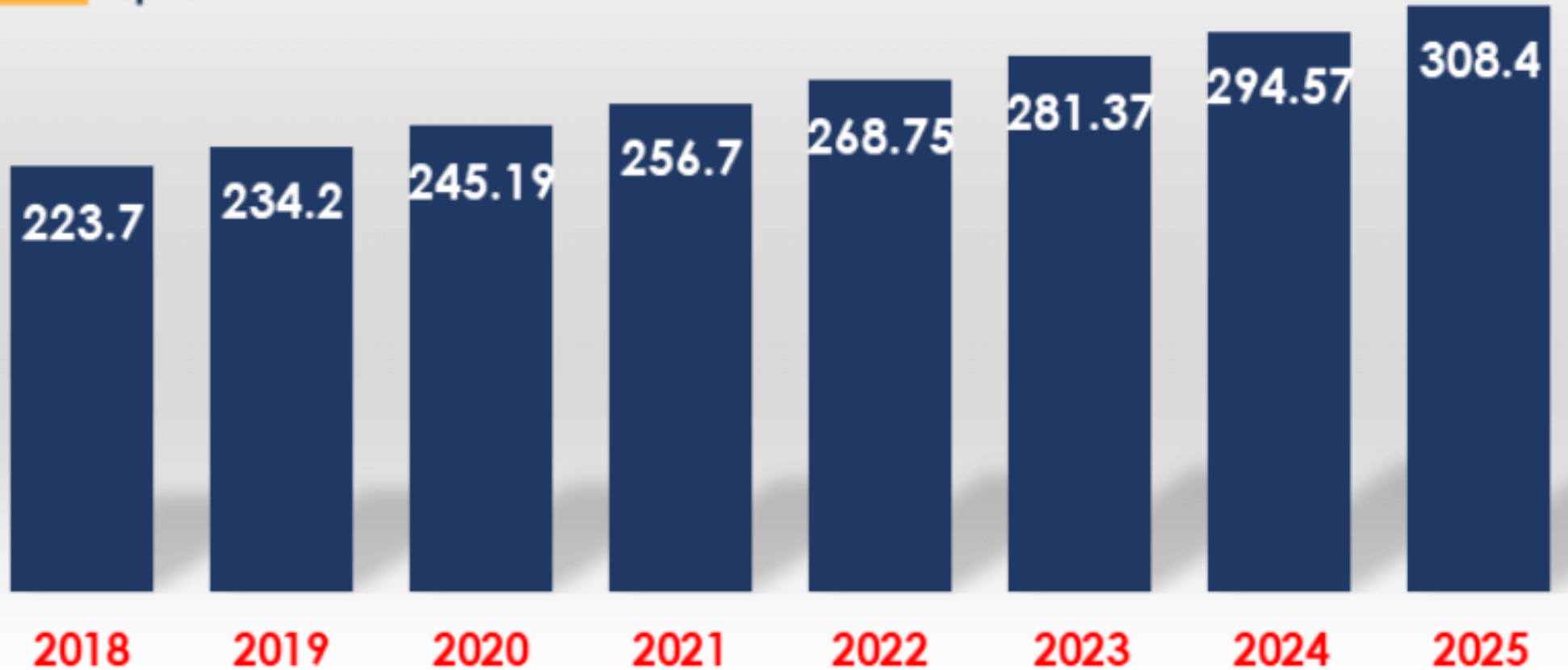
Agroecology
Political influence



Agrobusiness
influence



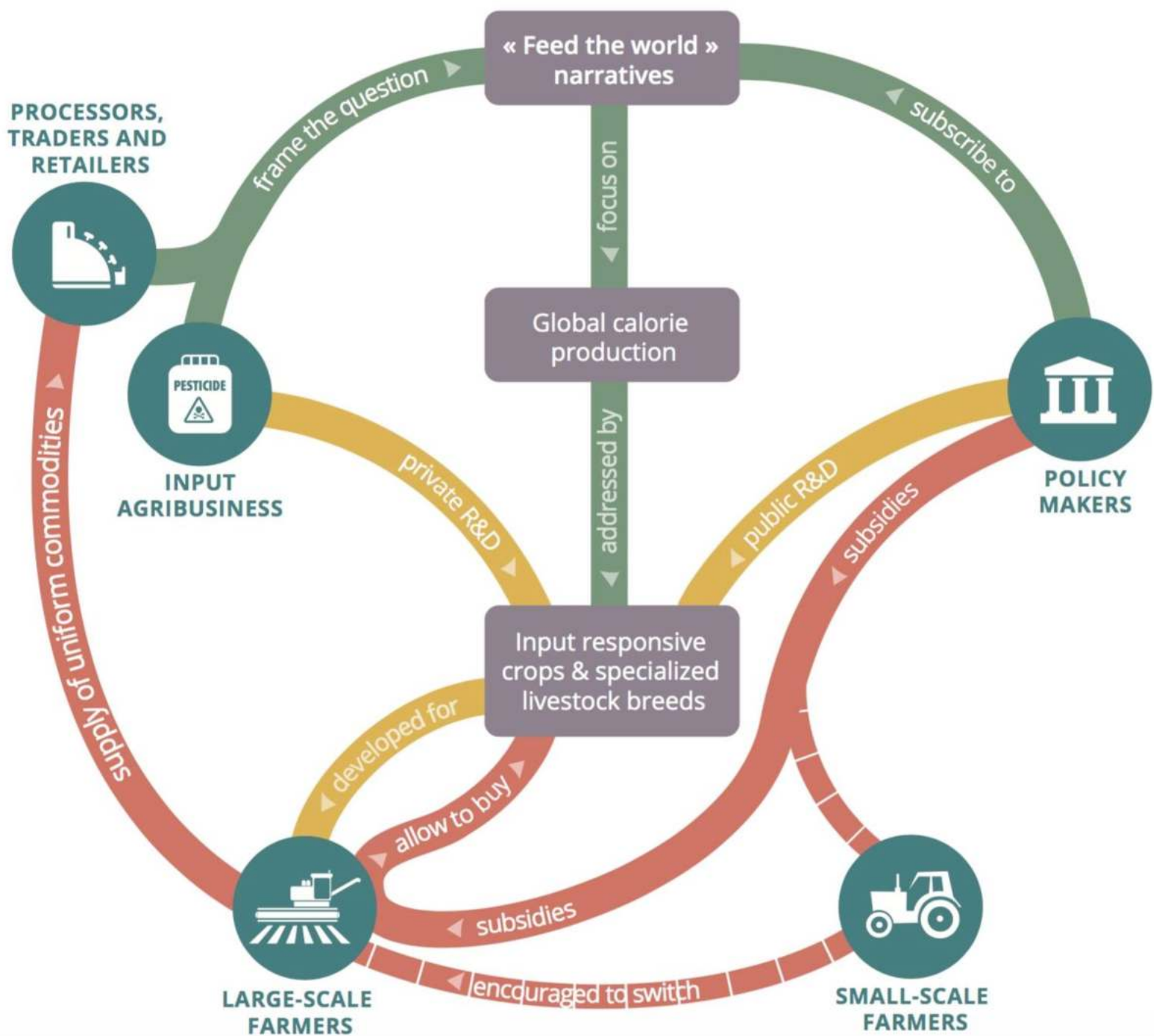
Global Agrochemical Market Size in USD billion (2018-2025)



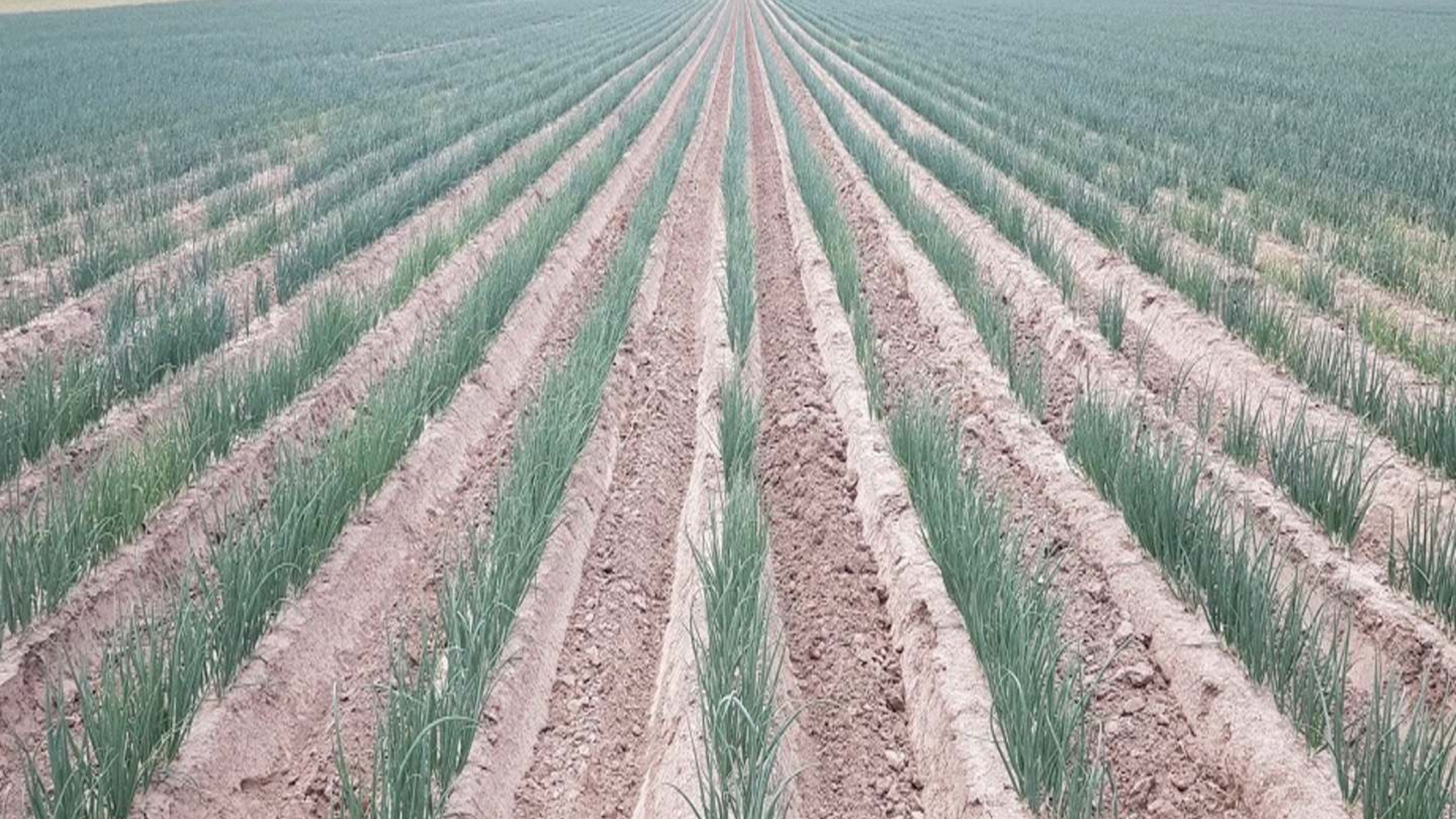




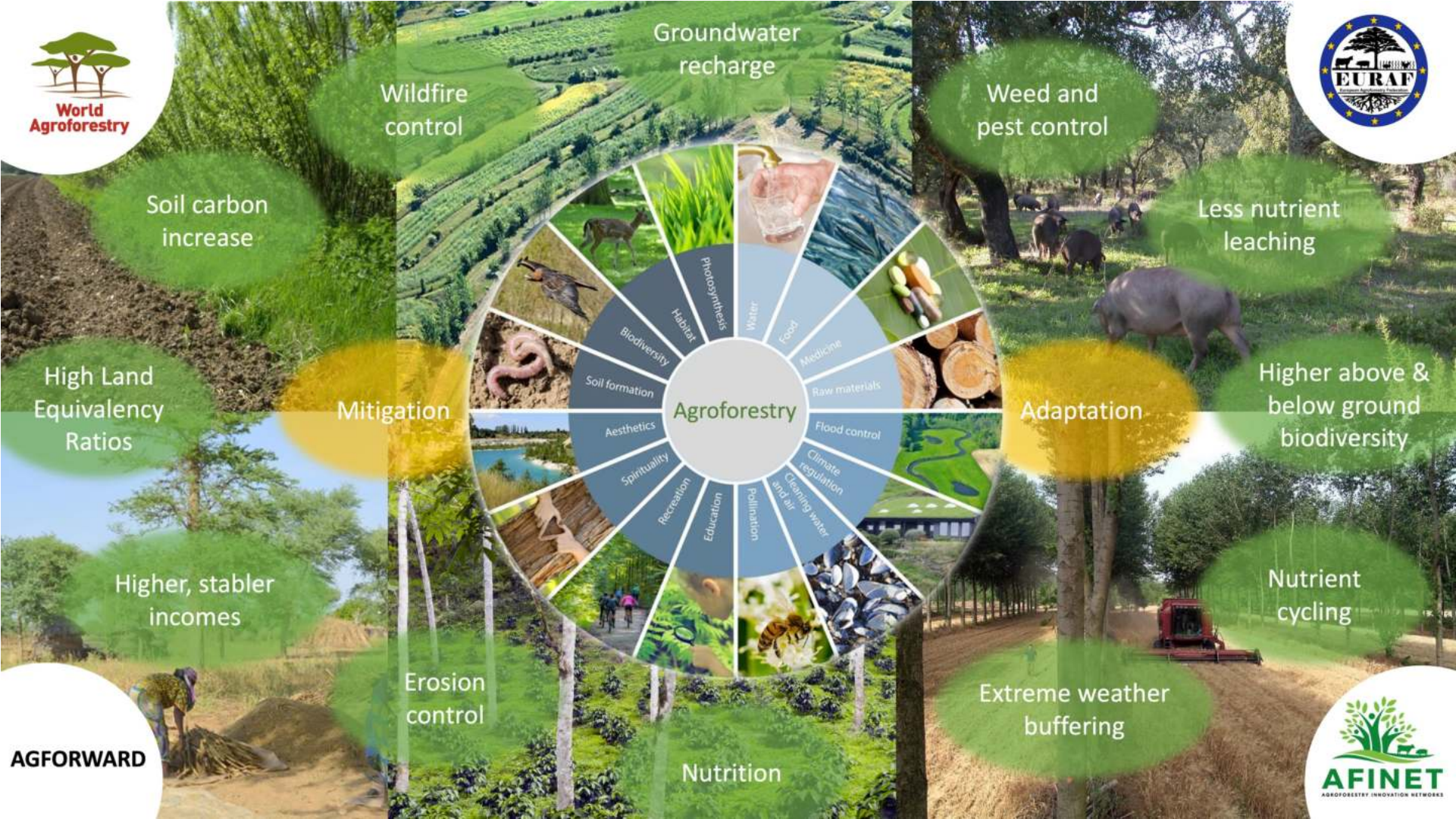
The “Feed the world” narrative





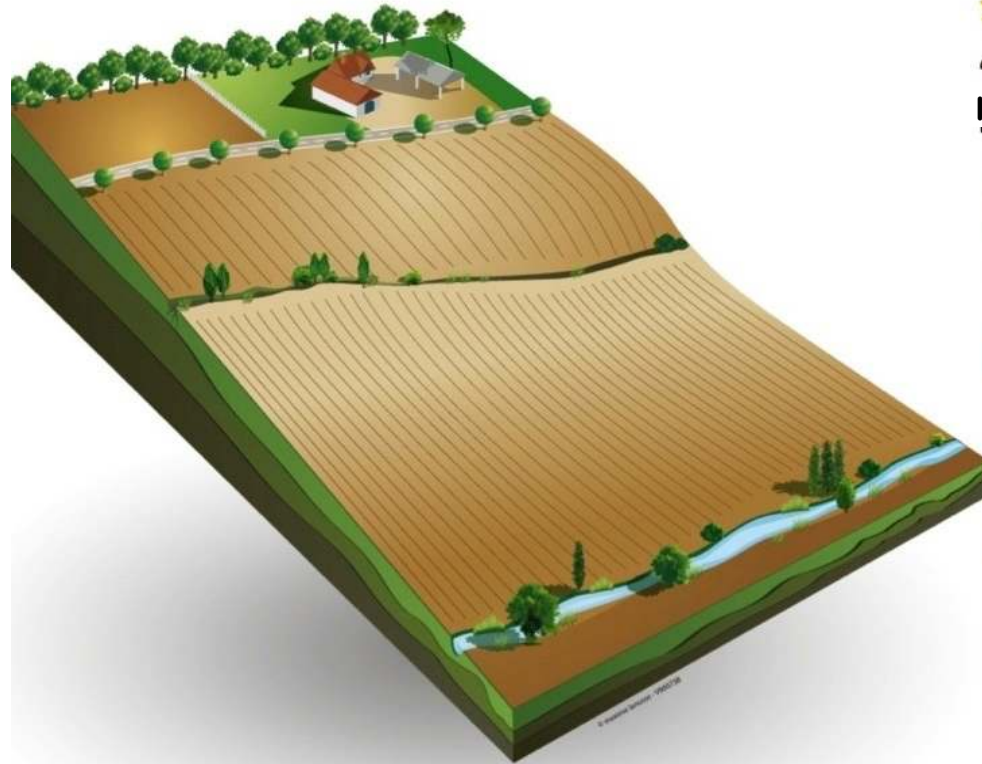








The present is win-lose



Natural resources
Des ressources naturelles



Inputs
Des intrants

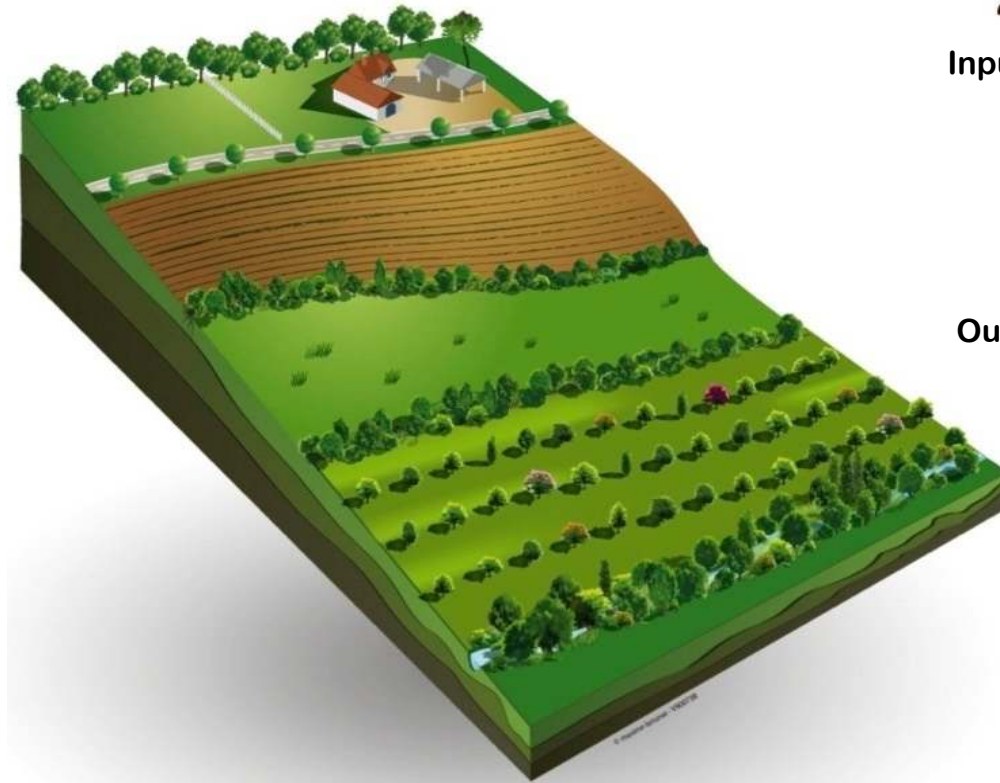


Outputs
Des produits





The future can be win-win.



Natural resources
DES ressources naturelles



Inputs
DES intrants



Outputs
DES produits





Thank you.