

Agroforestry for Resilience, Prosperity, and Vitality on Agricultural Lands

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Coon Valley, Wisconsin, 2018



Photo by Jon Lee

Coon Valley, Wisconsin, 2018



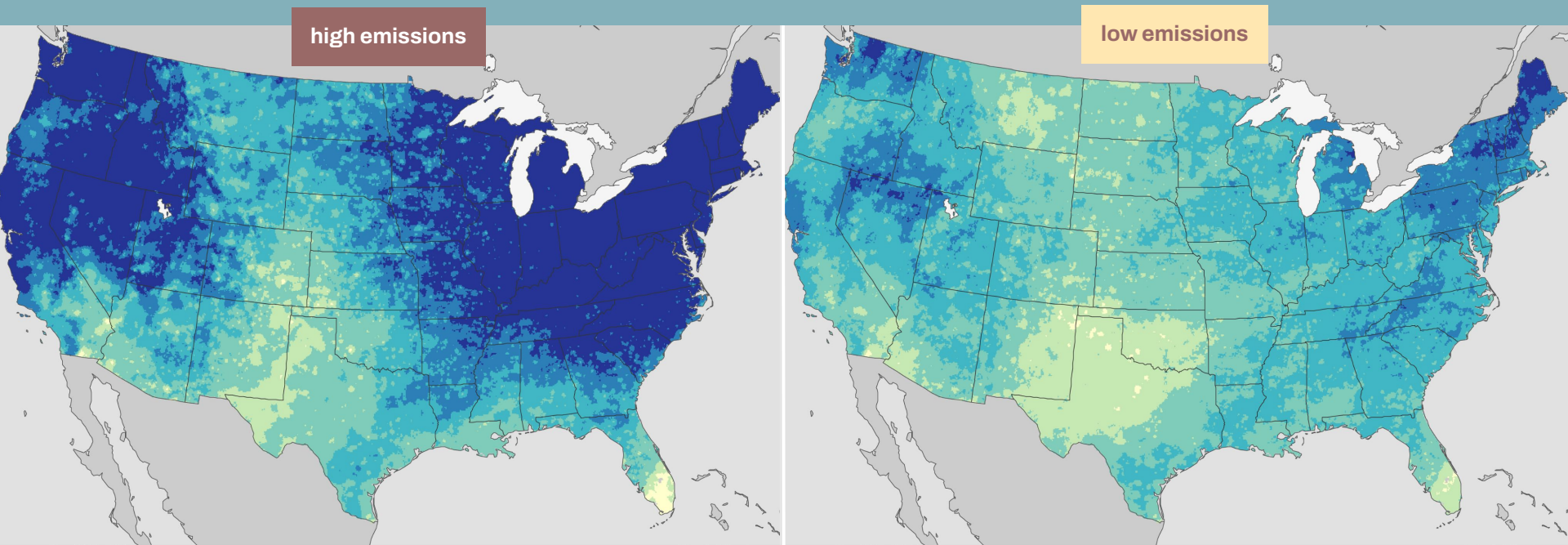
**“August 28 of 2018, it changed the way I farmed.
We had 14 inches of rain overnight.”**

- Tucker Gretebeck
All Seasons Farm

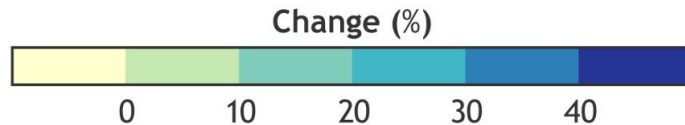


Photos by Jon Lee

Predicted Extreme Precipitation Change by 2100

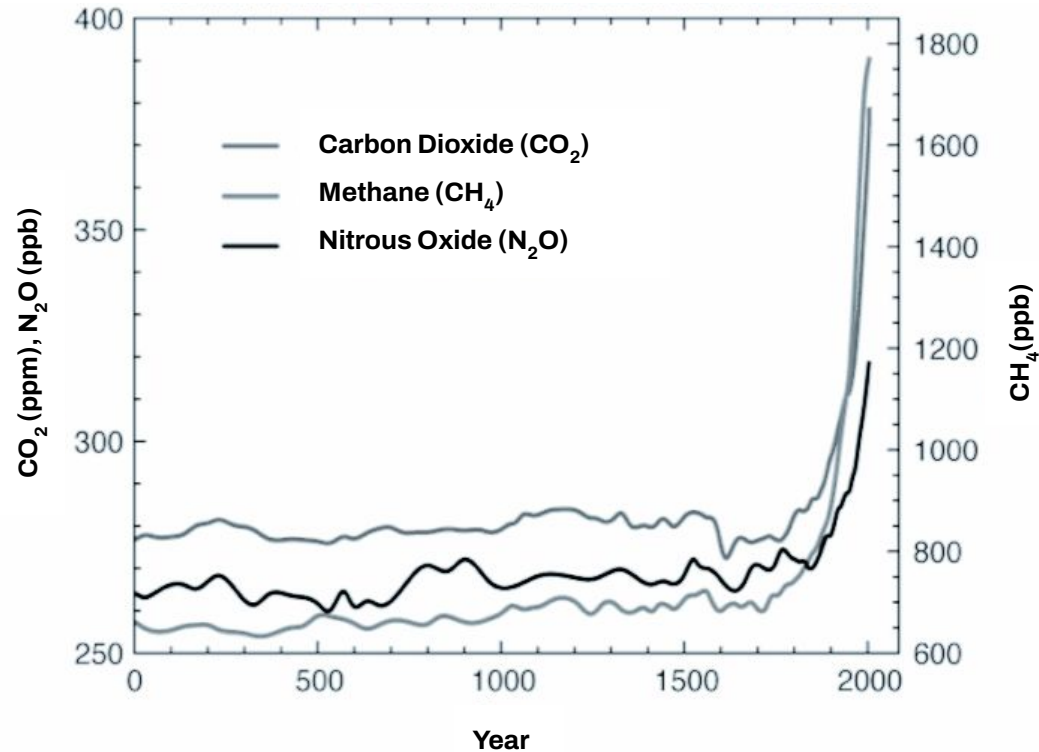


compared to 1986-2016



Source: NOAA Climate.gov, Data: NCA4

Greenhouse Gases, past 2,000 years

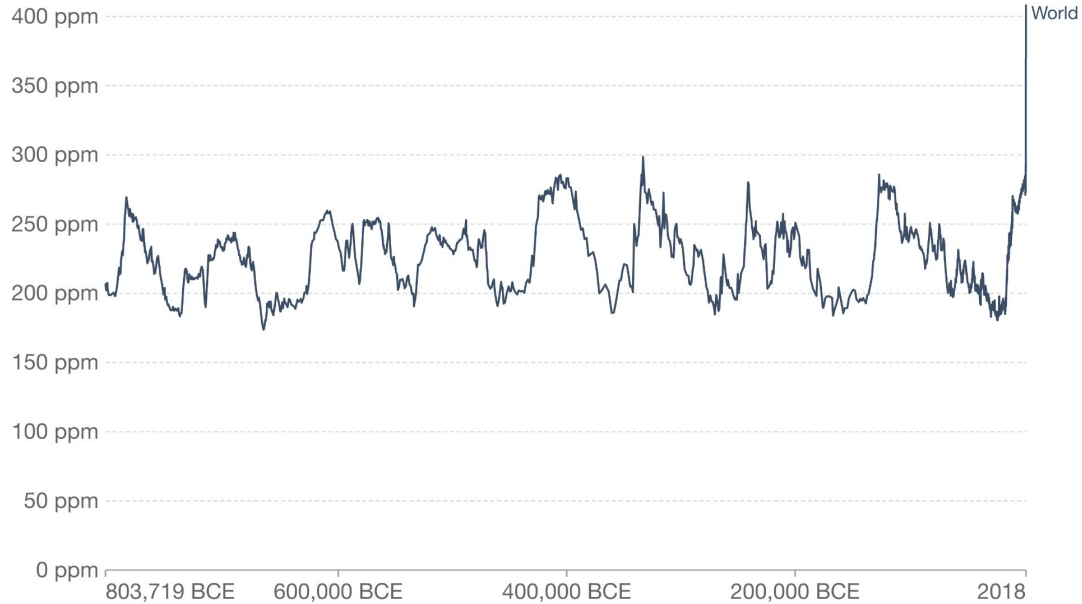


CO₂, past 800,000 years

Atmospheric CO₂ concentration

Global average long-term atmospheric concentration of carbon dioxide (CO₂), measured in parts per million (ppm). Long-term trends in CO₂ concentrations can be measured at high-resolution using preserved air samples from ice cores.

Our World
in Data



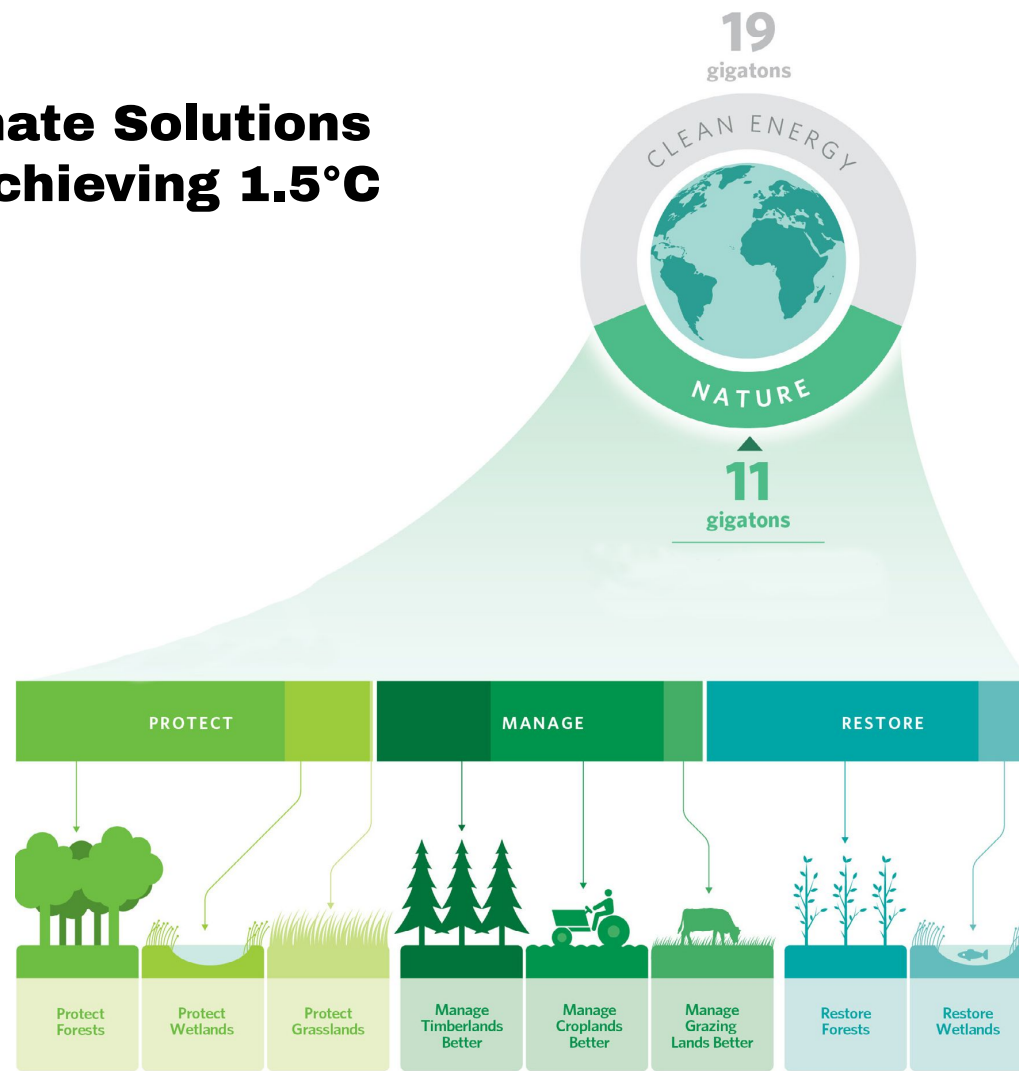
Source: EPICA Dome C CO₂ record (2015) & NOAA (2018)

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY



Source: Intergovernmental Panel on Climate Change (2007)

Natural Climate Solutions are key to achieving 1.5°C



US Nature
4Climate



Source: Griscom et al (2007)



USA Farms & Ranch NCS Pathway Mitigation Potential		
Carbon Sequestration Activities	Millions of tons of CO ₂ / year	Million Acres
Cropland Strategies		
Cover crops ¹	86 to 113	323
Cropland nutrient management ¹	46 to 144	396
Trees in cropland ²	71	39
Biochar ³	95	NA
Rangeland & Grassland Strategies		
Restoration of marginal croplands to grasslands ³	9	5
Avoided grassland conversion ³	107	2 (per year)
Trees in pasture ^{2,4}	87-188*	69
Improved manure management ³	24	NA
Grazing optimization ¹	6	383
Rangeland and Pasture Planting ¹	22-44**	53-99
Maximum Additional Potential Tons of CO₂	553-797	

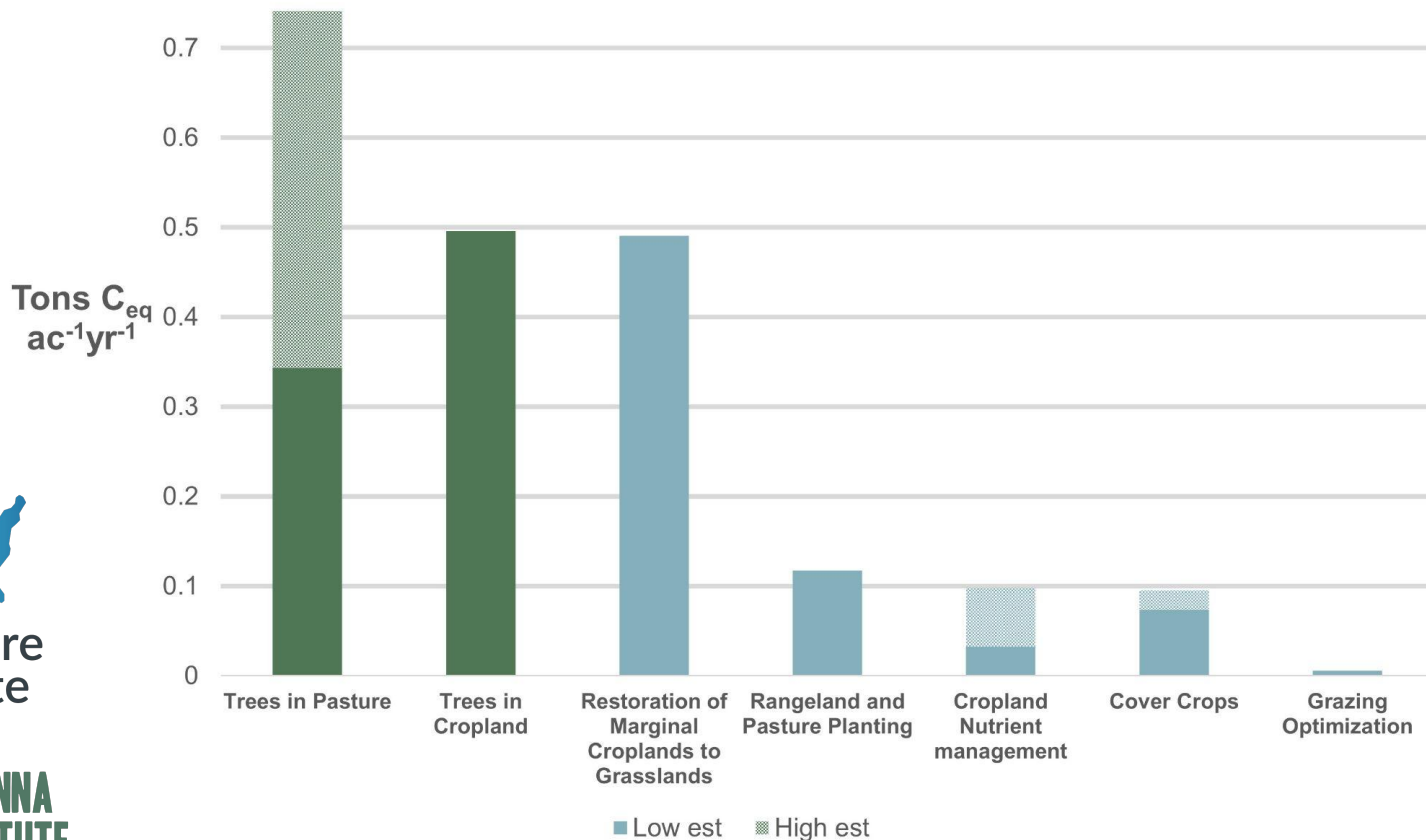
*Low end of range corresponds to silvopasture systems; the high end corresponds to reforestation of historically forested pasture

**Range based on estimates of the percentage of US rangeland that is degraded and thus in need of supplemental planting (Herrick et al. 2010).

Sources:

1) American Farmland Trust - estimates made using 2017 Census of Agriculture data & COMET-Planner Emission Reduction Coefficients - see www.farmland.org/carpetool for more information. 2) Cook-Patton, et al. in review 3) Fargione et al. 2018 4) Mulligan et al. 2020

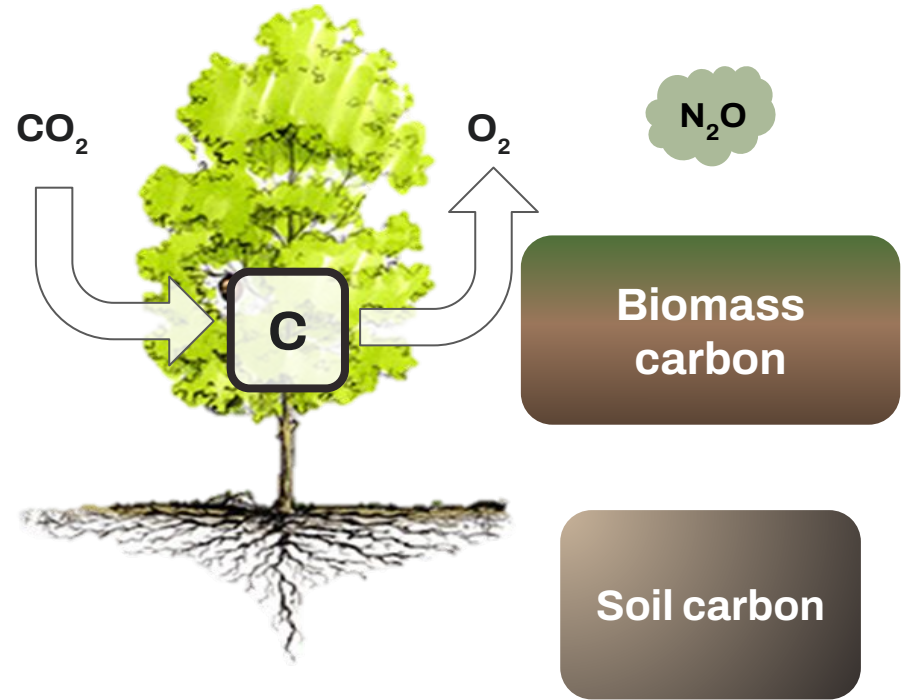
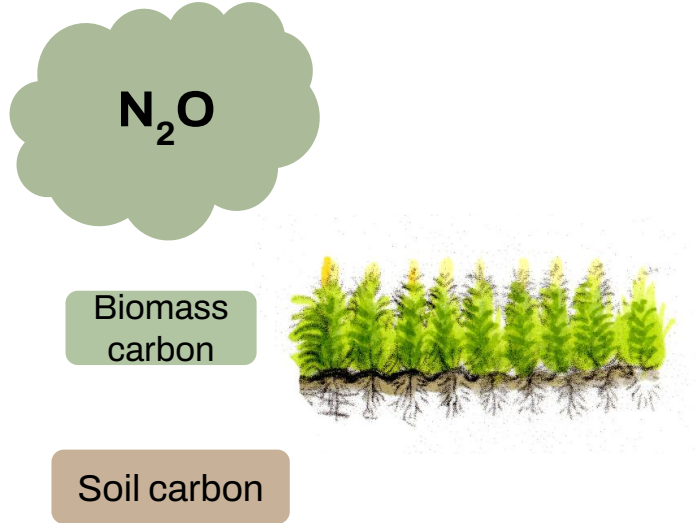
US Farm & Ranch Natural Climate Solutions



Compiled with data from COMET Planner Emissions Reduction Coefficient by American Farmland Trust. Fargione et al. (2018), Mulligan et al. (2020)

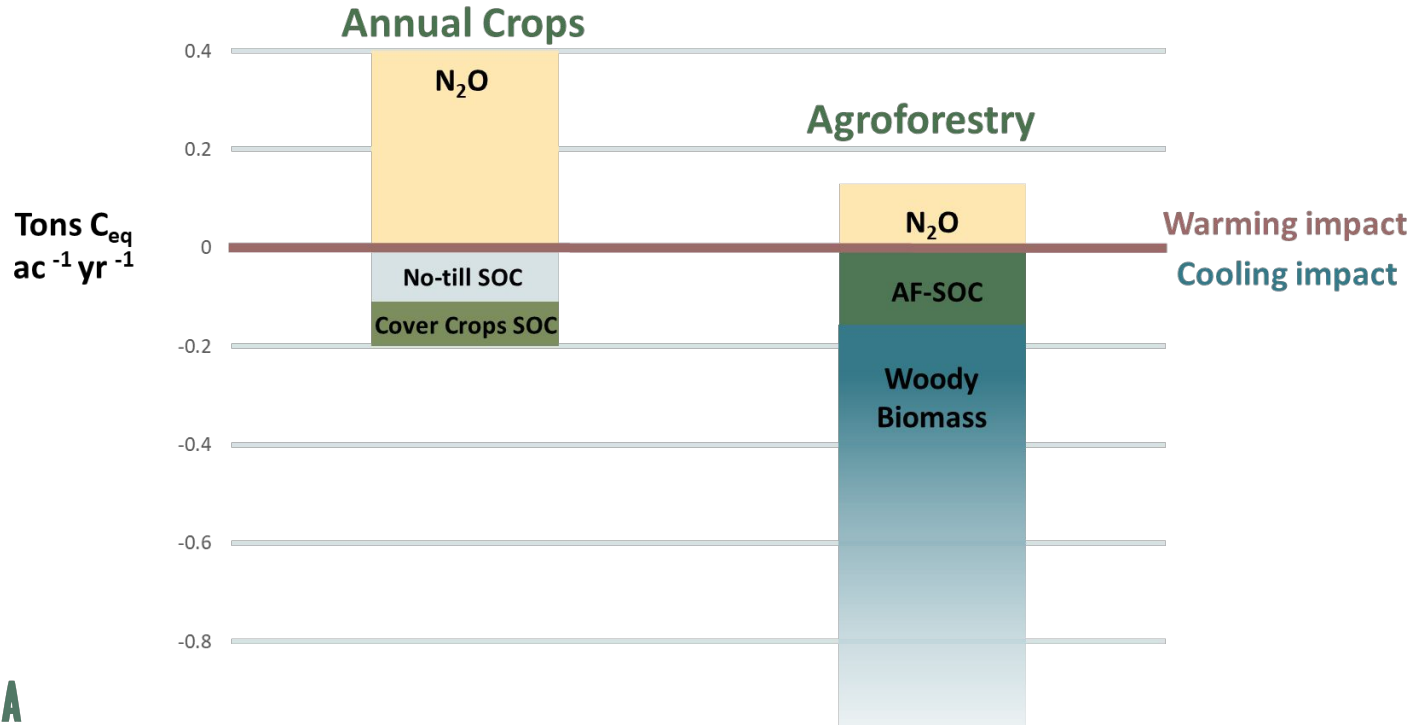
Why agroforestry?

Compared to annual crops, tree crops sequester more carbon dioxide and release less nitrous oxide.



Why agroforestry?

Agroforestry has a net-cooling impact on the climate—absorbing more greenhouse gases than it emits.



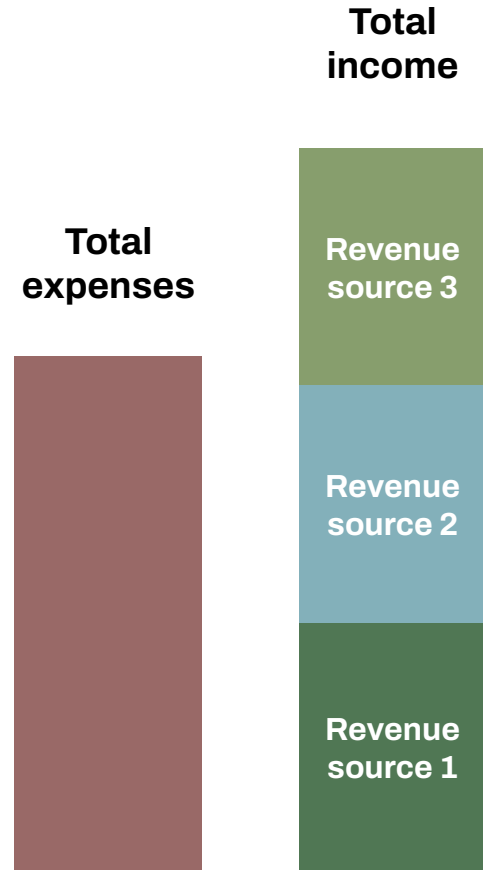
Compiled with data from Lawrence NC, Tenesaca CG, VanLoocke A, Hall SJ (2021), Ogle SM, Alsaker C, Baldock J, et al (2019), McClelland SC, Paustian K, Schipanski ME (2021), Wolz KJ, Branham BE, DeLucia EH (2018), Eddy WC, Yang WH (2022)

Why agroforestry?

Agroforestry allows farmers to diversify revenue sources and build financial resilience into their operations.

Revenue Diversification Opportunities

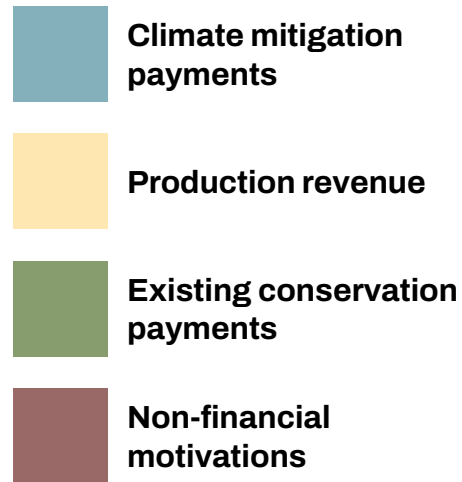
- Fruit and nut crops
- Timber and non-timber forest products
- Annual crops and livestock
- Rental payments from integrated alley or pasture enterprises
- Agritourism
- Federal and state conservation incentive payments
- Ecosystem and climate mitigation payments / markets



Scaling-up agroforestry with climate mitigation payments & markets

Decision threshold for high-rate of adoption

Decision threshold for low-rate of adoption



1

2

3

4

Alley cropping at Hudson Demonstration Farm near Urbana, IL



Photo by Canopy

Windbreak at Fields Restored Demonstration Farm near Oregon, IL



Photo by Savanna Institute

Riparian buffer at Lily Springs Farm near Osceola, WI



“The beauty of agroforestry is that it is so adaptable to so many different kinds of ecosystems, food production goals, and labor capacities.”

- Elle Sullivan, Lily Springs Farm



Silvopasture at Branches & Berries Farm near Wauzeka, WI



“We produce healthy food, with the cows, healthy meat. Besides that, we use the fertilizer from the cows without having to spend money on machinery to bring that fertilizer to the ground.”

- Wendy Peralta, Branches & Berries



**Agroforestry means we can
grow food on less land and
fight climate change.**

Land equivalent ratio



LER = 1.4

Mead and Willey, 1980



Silvopasture at All Seasons Farm near Coon Valley, WI

“Our watershed group is bringing farmers together so we can show them how to get this stuff done.”

- Tucker Gretebeck, All Seasons Farm



Photo by Savanna Institute

How can we reach the full potential of agroforestry?

1

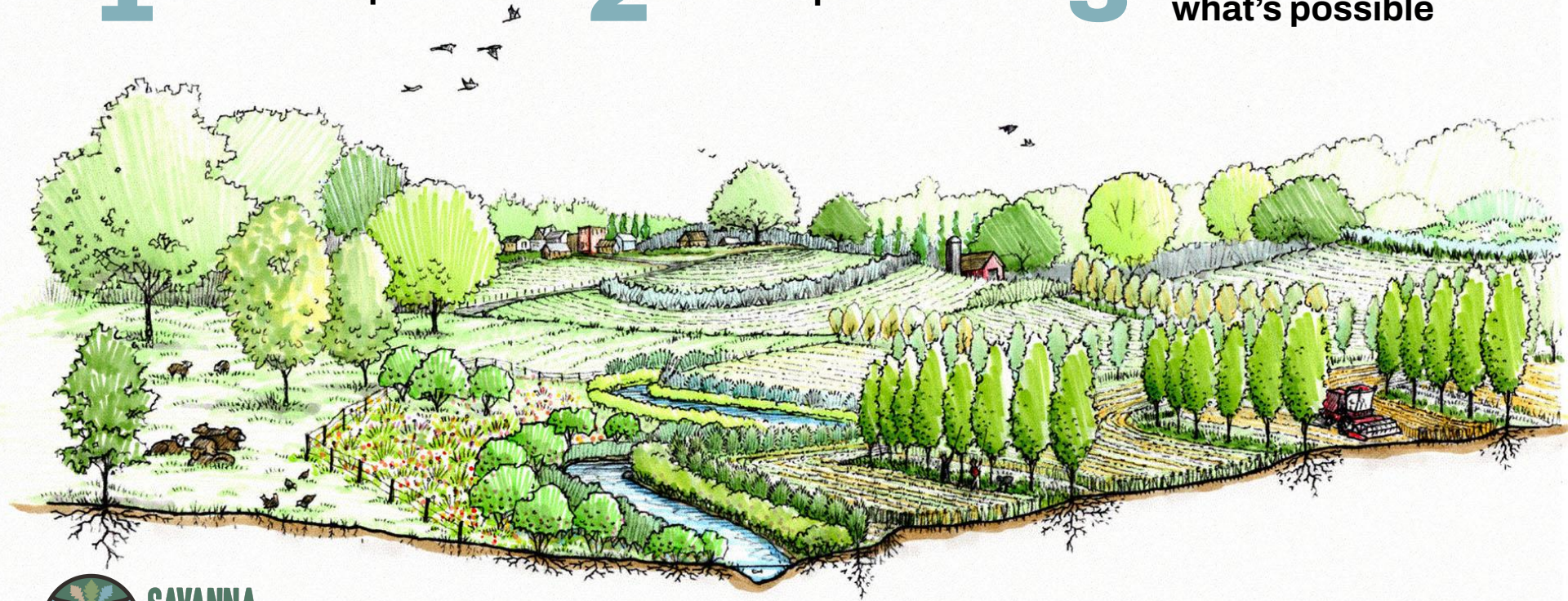
De-risk adoption

2

Scale up now

3

Expand
what's possible



How can we reach the full potential of agroforestry?

1

De-risk adoption

- Technical assistance

The Nature Conservancy 

 SAVANNA INSTITUTE

 ORGANIC VALLEY



Photo by Organic Valley

How can we reach the full potential of agroforestry?

1

De-risk adoption

- Technical assistance
- Demonstration farms



Photo by Savanna Institute

How can we reach the full potential of agroforestry?

1

De-risk adoption

- Technical assistance
- Demonstration farms
- Access to markets, financing, and crop insurance



How can we reach the full potential of agroforestry?

2

Scale up now

- Pull with markets



How can we reach the full potential of agroforestry?

2

Scale up now

- Pull with markets
- Push with incentives



Photo by Canopy



How can we reach the full potential of agroforestry?

2

Scale up now

- Pull with markets
- Push with incentives
- Make it easy



Photo by Canopy



How can we reach the full potential of agroforestry?

3

Expand what's possible

- Tree crop research and development



Photo by Savanna Institute

How can we reach the full potential of agroforestry?

3

Expand what's possible

- Tree crop research and development
- Increase agricultural productivity



How can we reach the full potential of agroforestry?

3

Expand what's possible

- Tree crop research and development
- Increase agricultural productivity
- Renew social contract with farmers





Thank you!



Inspired by the oak savanna ecosystem native to the region, the Savanna Institute conducts research, education, and outreach to support the growth of diverse, perennial agroecosystems in the upper Midwest.

savannainstitute.org





How do we get there?

1. De-risk adoption

- Technical assistance
 - i. With 2 TSPs, we were able to reach 43 farms and 2,500 acres in 2022. Our team is growing to 8 TSPs this year, and we're networked with other orgs developing train the trainer curriculum so we can grow the ranks.
 - ii. Climate smart
 - iii. Enterprise budgets and planning tools
 - 1. SHOW OFF TSP TOOLS, CIAS COMPASS
- Demonstration farms
 - i. See it to believe it. We have over 1,000 acres we own, lease, or sublease in demonstration farms, plus a network of several dozen existing farms with agroforestry that we partner with in field days, trainings, and as mentors in our apprenticeship program.
- Appropriate markets, finance, & crop insurance
 - i. ES markets - need PCSC to codify standards. Need FSA loans and crop insurance that works for longer time horizons and greater uncertainty



How do we get there?

1. De-risk adoption

2. Scale now

- Pull with markets
 - i. Not just carbon, but need food companies to invest in domestic production of tree crops
- Push with incentives
 - i. Target landowners & succession. Tax advantage.
- Make it easy for landowners
 - i. Canopy

3. Expand what's possible



How do we get there?

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3. Expand what's possible



How do we get there?

1. **De-risk adoption**
2. **Scale now**
3. **Expand what's possible**
 - R&D for 21st century trees and tools
 - Increase productivity of US agriculture by boosting Land Equivalent Ratio & productive conservation
 - Renew the social contract among farms and society



Economics and Prosperity

Subtitle here

- Diversification and higher value
- Black walnut alley cropping paper
- Market trends toward fruits and nuts
- Ecosystem Services



Agroforestry

Integrating trees with crops and livestock
to yield benefits for people and the land.



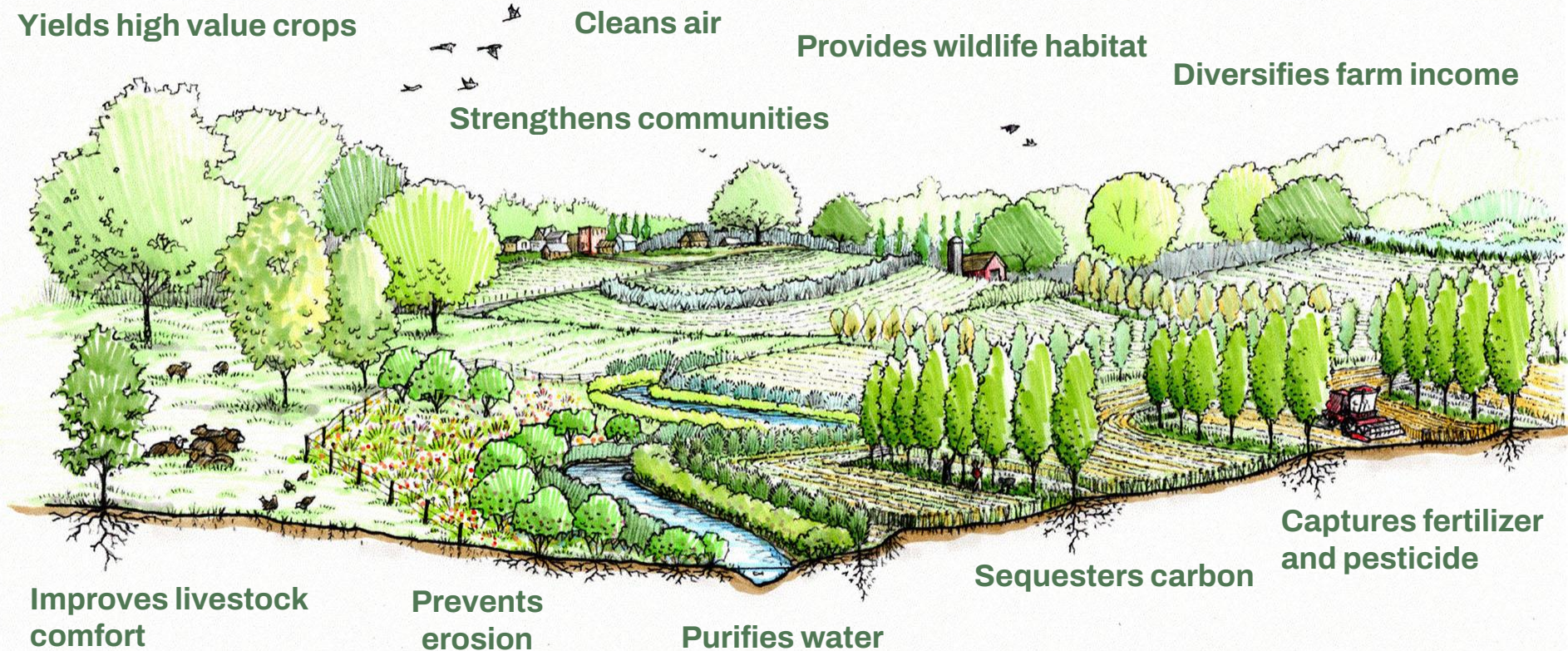
Yields high value crops

Cleans air

Provides wildlife habitat

Diversifies farm income

Strengthens communities



Improves livestock
comfort

Prevents
erosion

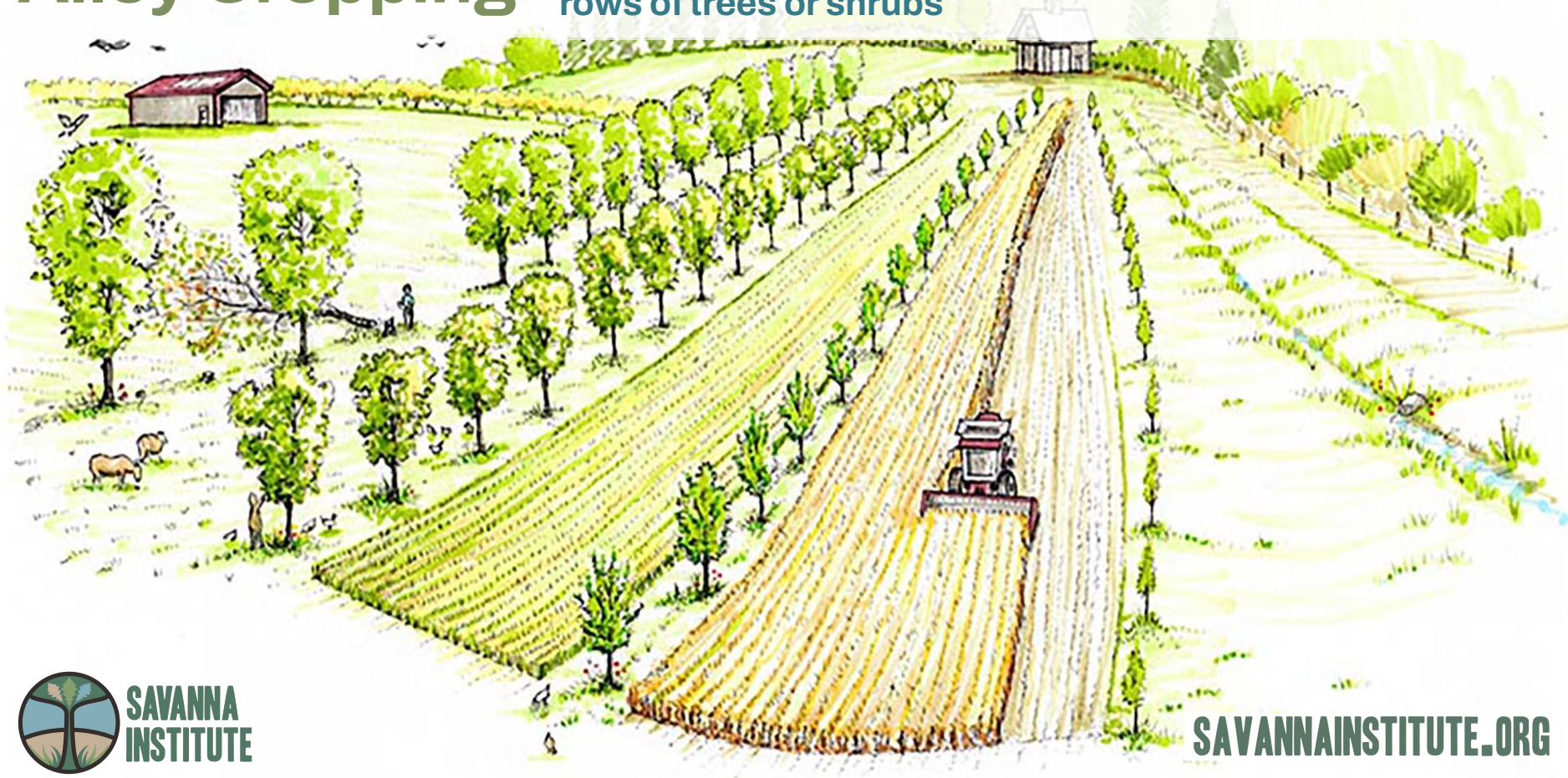
Purifies water

Sequesters carbon

Captures fertilizer
and pesticide

Alley Cropping

The cultivation of crops in alleys between regularly spaced rows of trees or shrubs



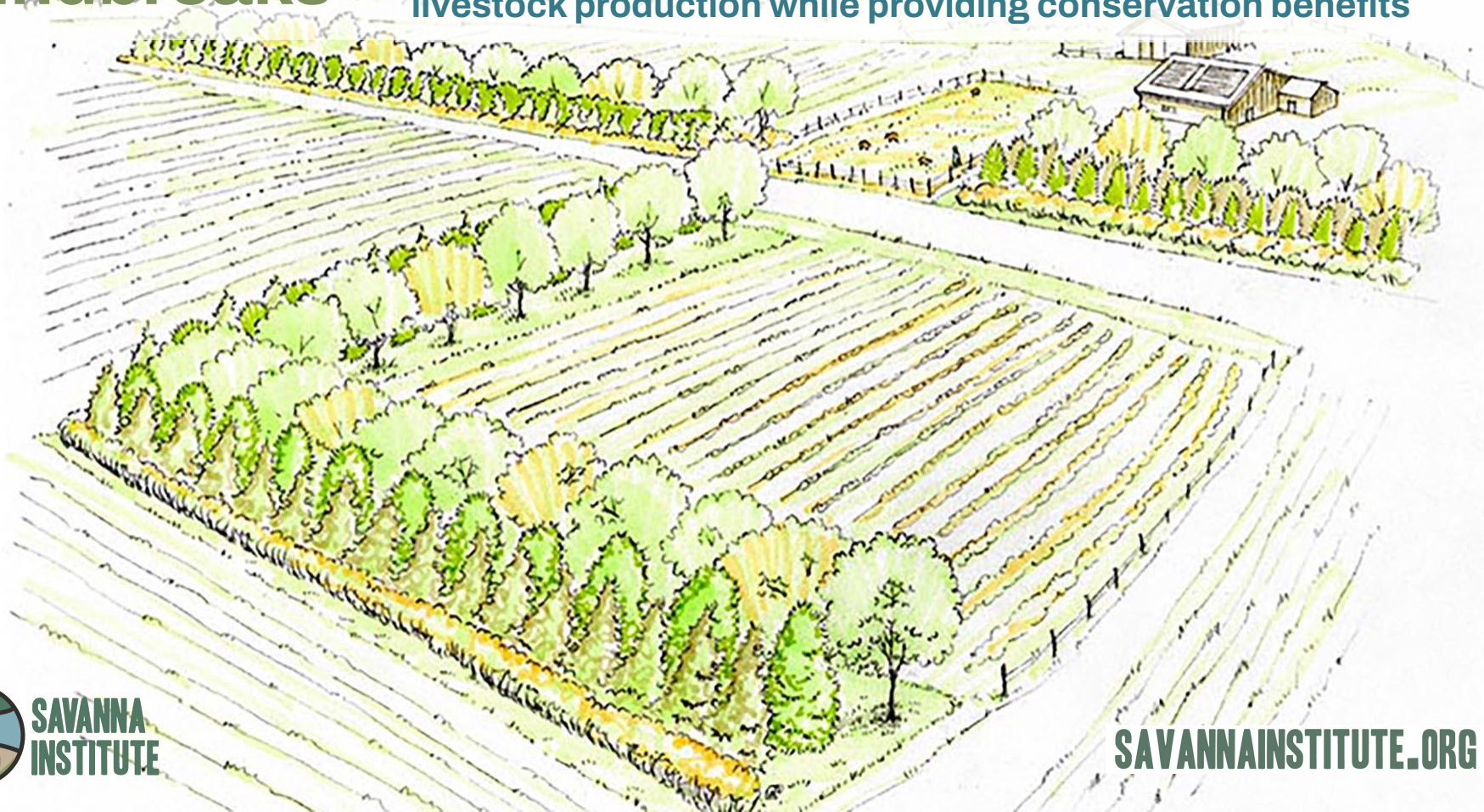
Silvopasture

The intentional integration of trees, pasture and livestock managed in a single system



Windbreaks

Strips of trees and shrubs designed to enhance crop and livestock production while providing conservation benefits



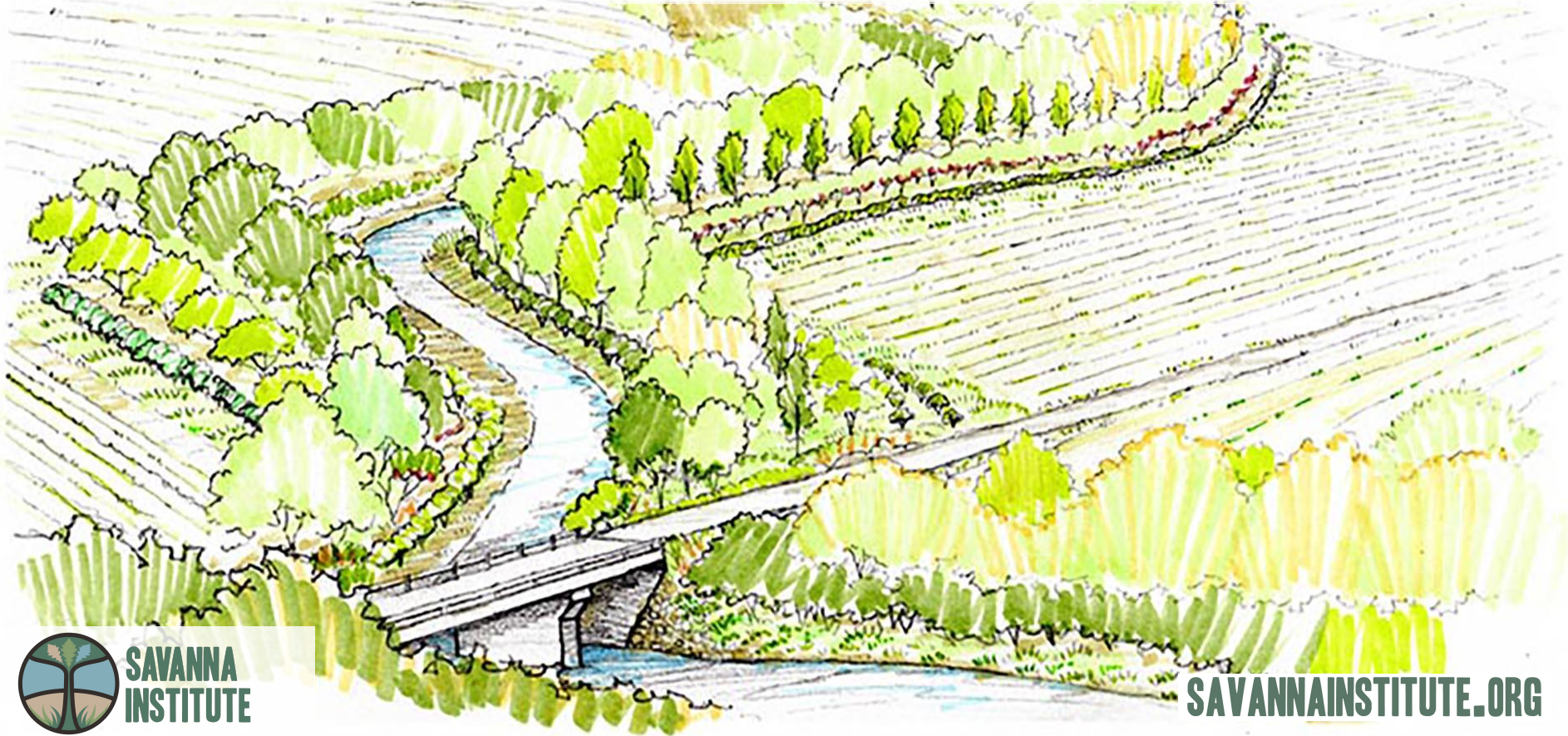
Forest Farming

The cultivation of specialty crops under existing forest canopies



Riparian Buffers

Strips of permanent vegetation alongside a stream, lake or wetland



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INSTITUTE**

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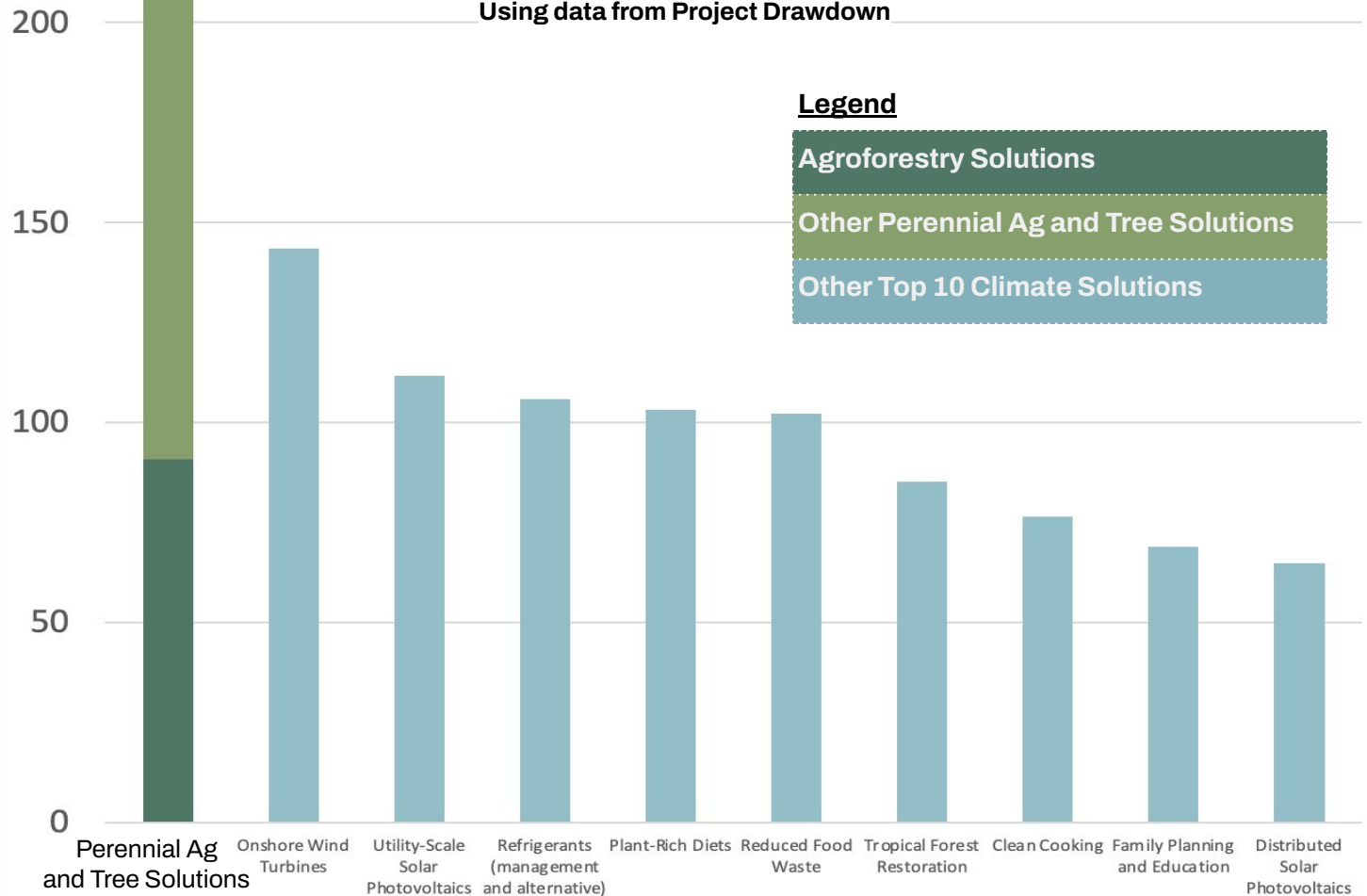
Agroforestry and other tree-based solutions rank globally among the most impactful climate change solutions

Gigaton CO₂
Equivalent
Reduced /
Sequestered for
1.5°C warming
(2020–2050)



Top Climate Solutions

Using data from Project Drawdown



Land-based measures to mitigate climate change: potential and feasibility in developed countries

