Alliance

Bioversity International

CIAT
International Center for Tropical Agriculture
Since 1967 Science to cultivate change

CGIAR

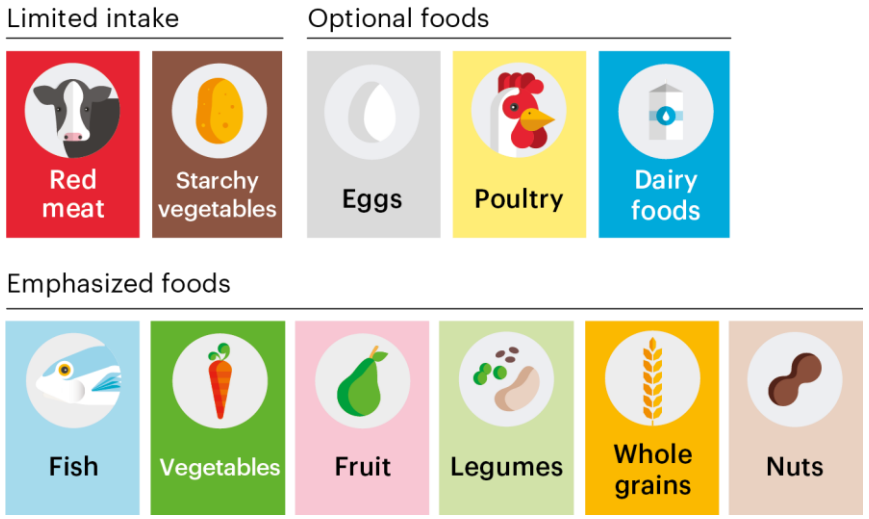
EAT

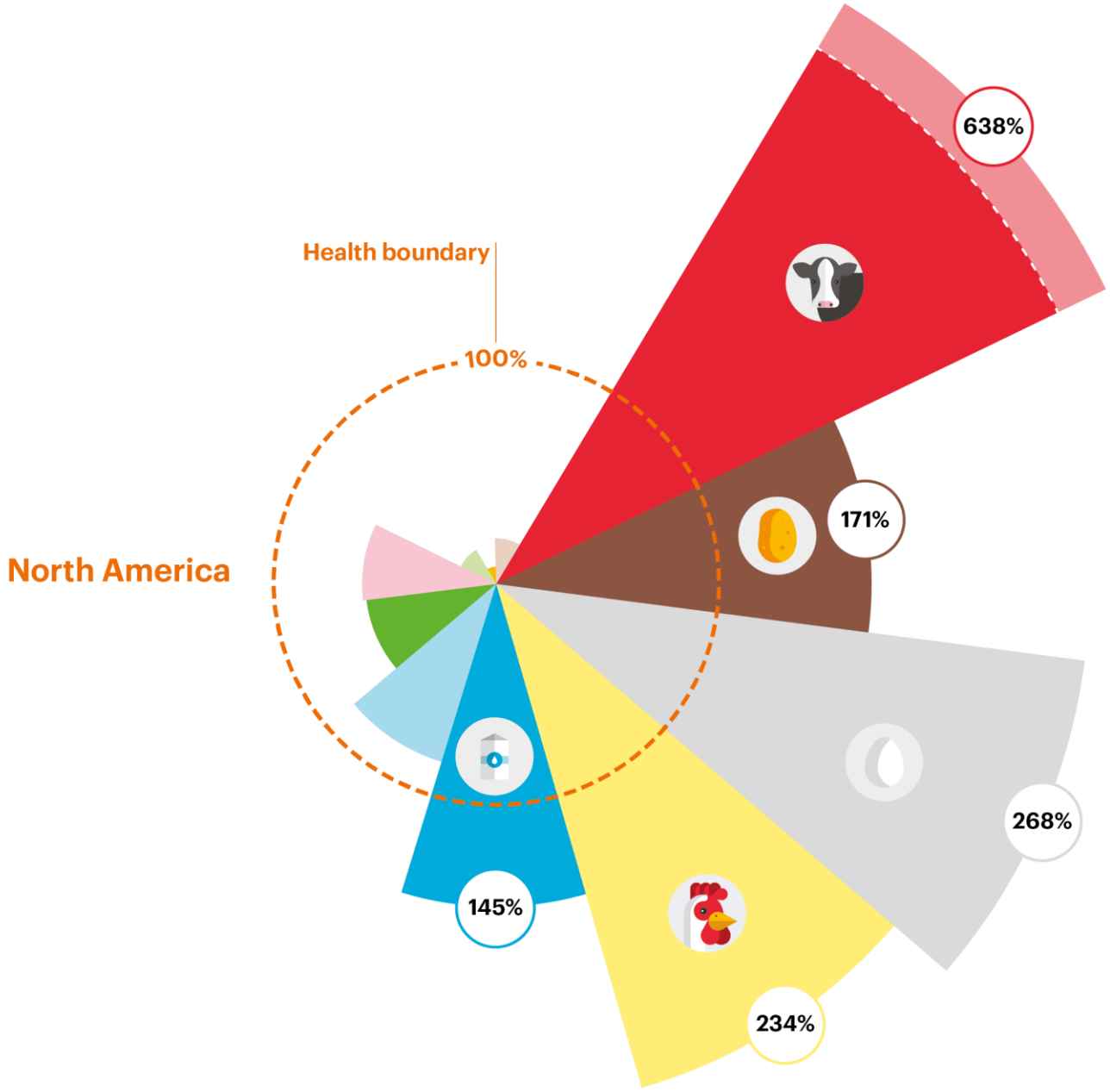
Comment la science peut-elle guider cette transition?

Food in the Anthropocene: the EAT–*Lancet* Commission on healthy diets from sustainable food systems

Walter Willett, Johan Rockström, Brent Loken, Marco Springmann, Tim Lang, Sonja Vermeulen, Tara Garnett, David Tilman, Fabrice DeClerck, Amanda Wood, Malin Jonell, Michael Clark, Line J Gordon, Jessica Fanzo, Corinna Hawkes, Rami Zurayk, Juan A Rivera, Wim De Vries, Lindiwe Majele Sibanda, Ashkan Afshin, Abhishek Chaudhary, Mario Herrero, Rina Agustina, Francesco Branca, Anna Lartey, Shenggen Fan, Beatrice Crona, Elizabeth Fox, Victoria Bignet, Max Troell, Therese Lindahl, Sudhvir Singh, Sarah E Cornell, K Srinath Reddy, Sunita Narain, Sania Nishtar, Christopher J L Murray

Current Intakes vs Planetary Health Diet

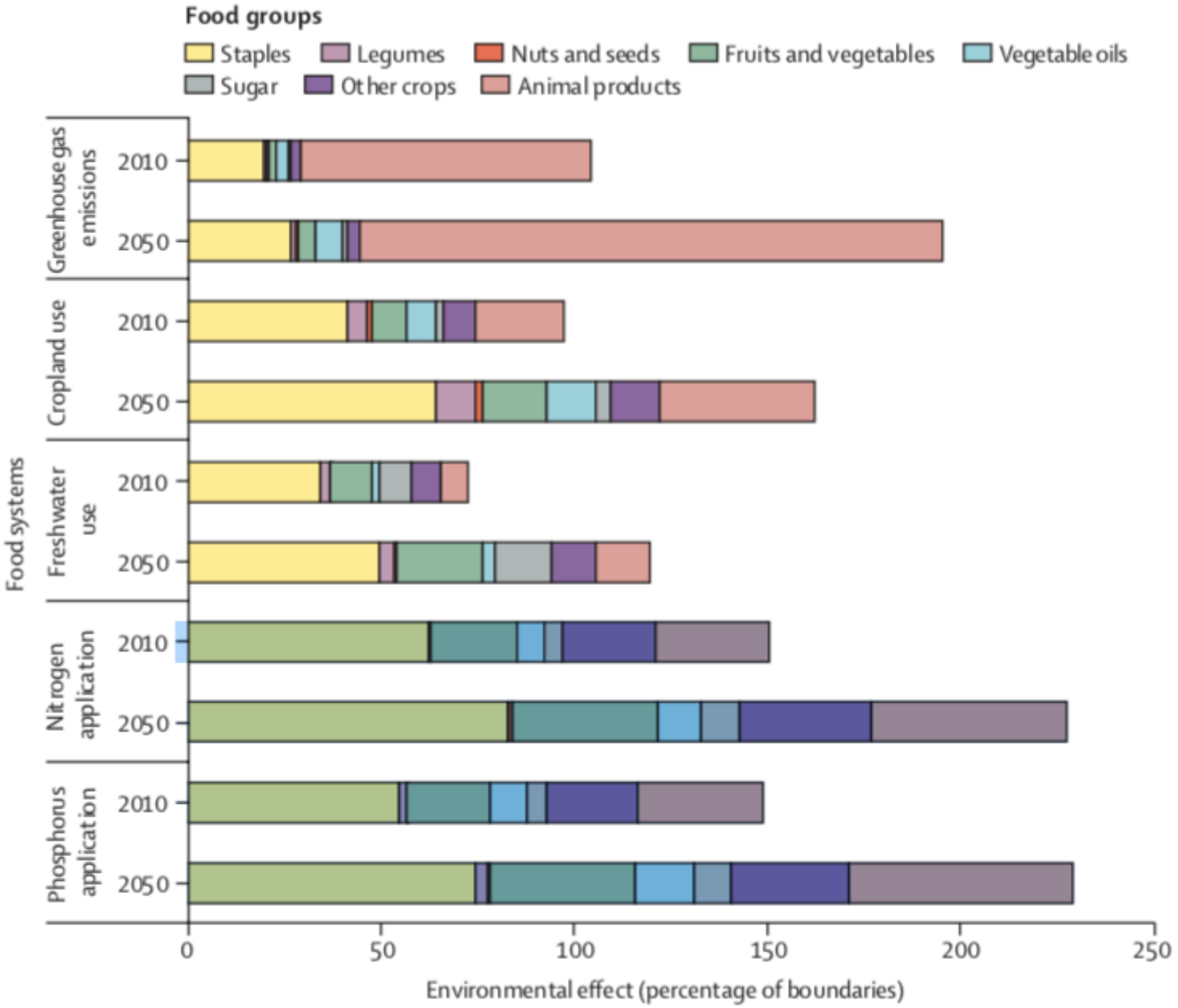




Target 2 – **Sustainable Food Production**

Earth system process	Control variable	Boundary (Uncertainty range)	Global Implication
Climate change	 **GHG emissions**	**5 Gt CO_2-eq yr^{-1}** (4.7 – 5.4 Gt CO_2-eq yr^{-1})	No new emissions from Agriculture
Land-system change	 **Cropland use**	**13 M km^2** (11–15 M km^2)	0 land expansion 10-20% Integrity km^2
Freshwater use	 **Water use**	**2,500 km^3 yr^{-1}** (1000–4000 km^3 yr^{-1})	>30% flows in basins
Nitrogen cycling	 **N application**	**90 Tg N yr^{-1}** (65–90 Tg N yr^{-1}) * (90–130 Tg N yr^{-1})**	Pollution <1 – 2.5 mg N L^{-1}
Phosphorus cycling	 **P application**	**8 Tg P yr^{-1}** (6–12 Tg P yr^{-1}) * (8–16 Tg P yr^{-1})**	Pollution <50- 100 mg P m^{-3}
Biodiversity loss	 **Extinction rate**	**10 E/MSY** (1–80 E/MSY)	50% land intact by ecoregion

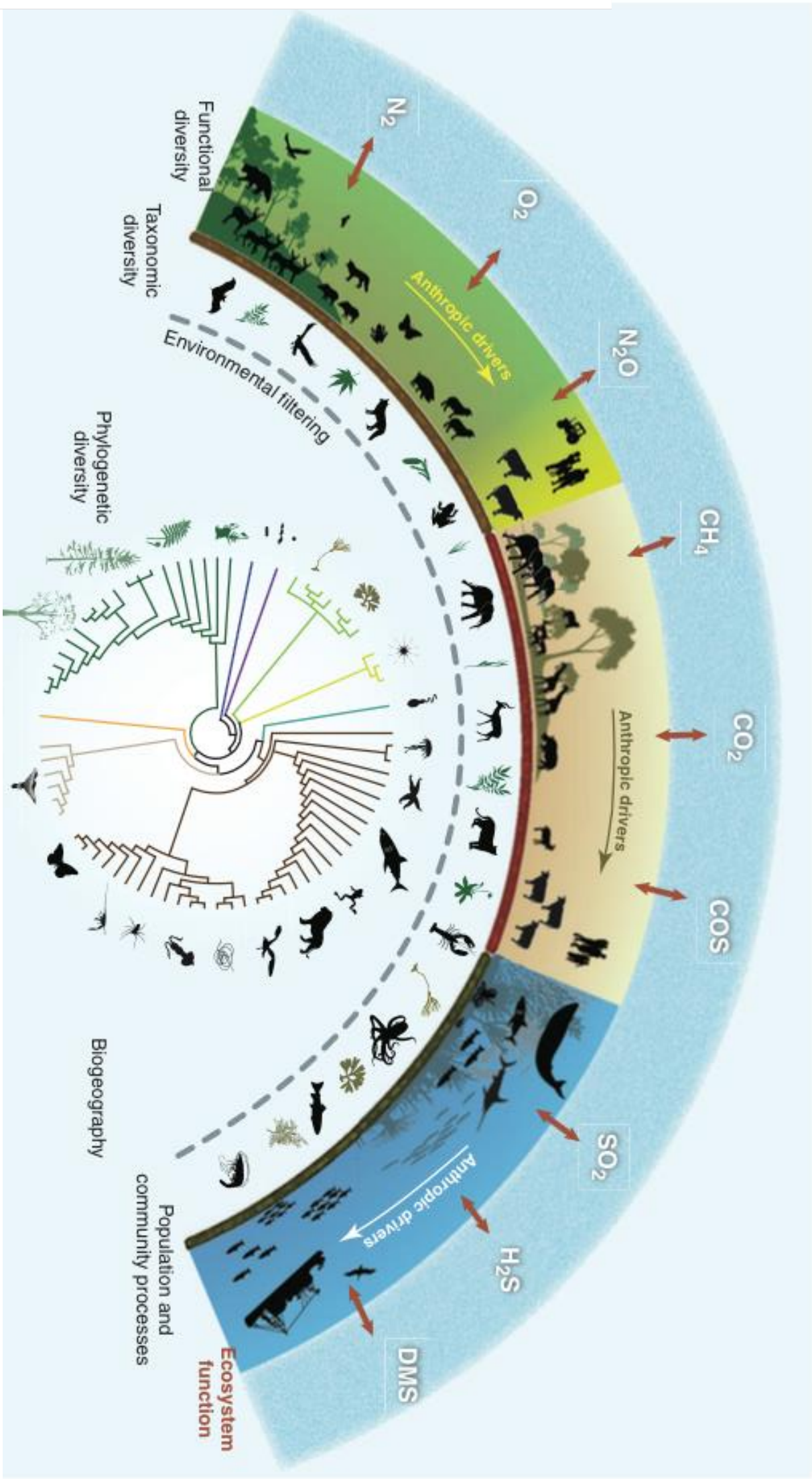
Global Adoption of the Western diet is not an option



The Functions of Biological Diversity in an Age of Extinction

Shahid Naeem,[1]* J. Emmett Duffy,[2] Erika Zavaleta[3]

www.sciencemag.org SCIENCE VOL 336 15 JUNE 2012

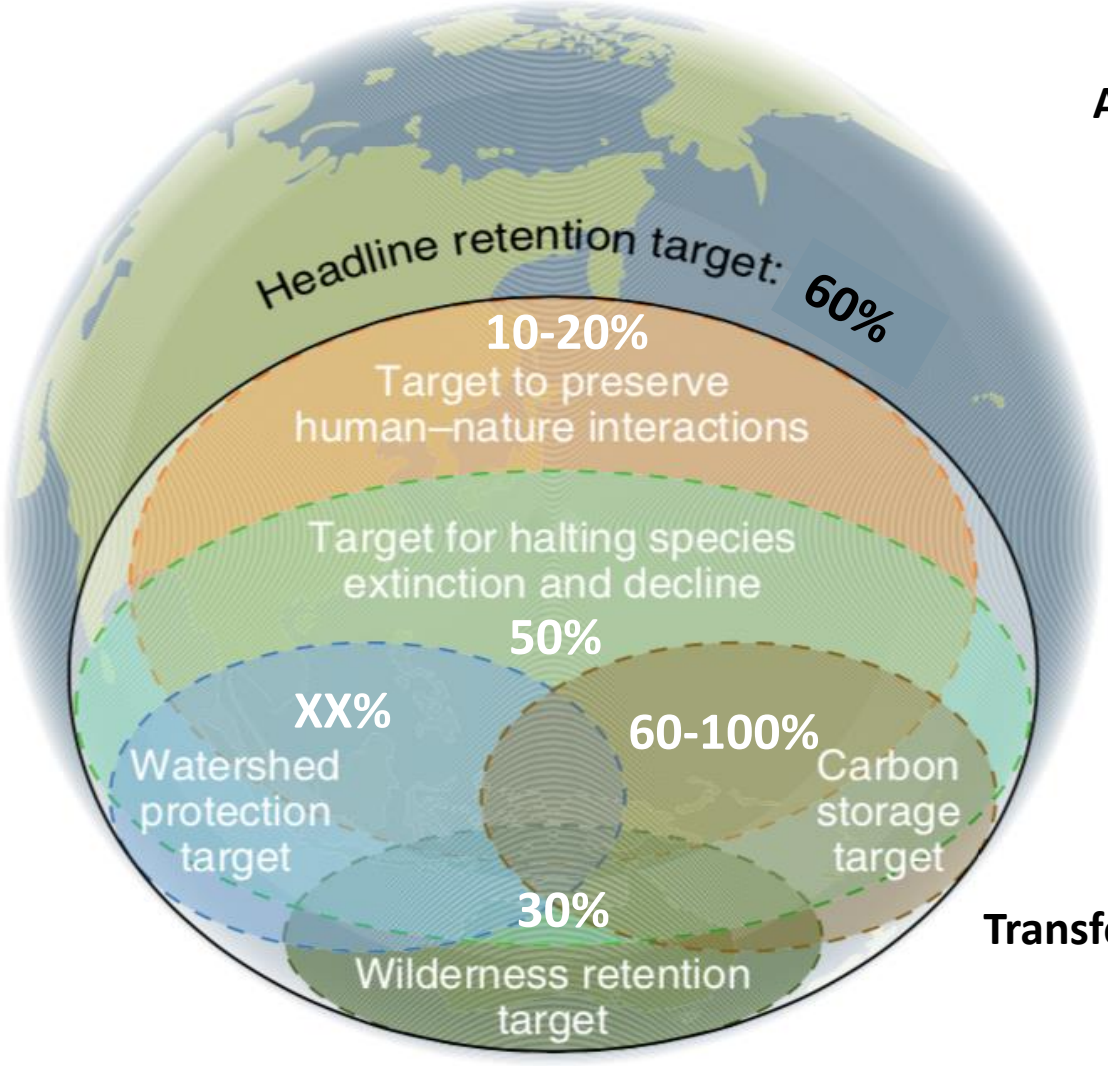


Bold nature retention targets are essential for the global environment agenda

Ambitious targets for the retention — not just formal protection — of nature are urgently needed to conserve biodiversity and to maintain crucial ecosystem services for humanity.

Martine Maron, Jeremy S. Simmonds and James E. M. Watson

AR^{3}T Framework



Avoid conversion (no net loss of nature)

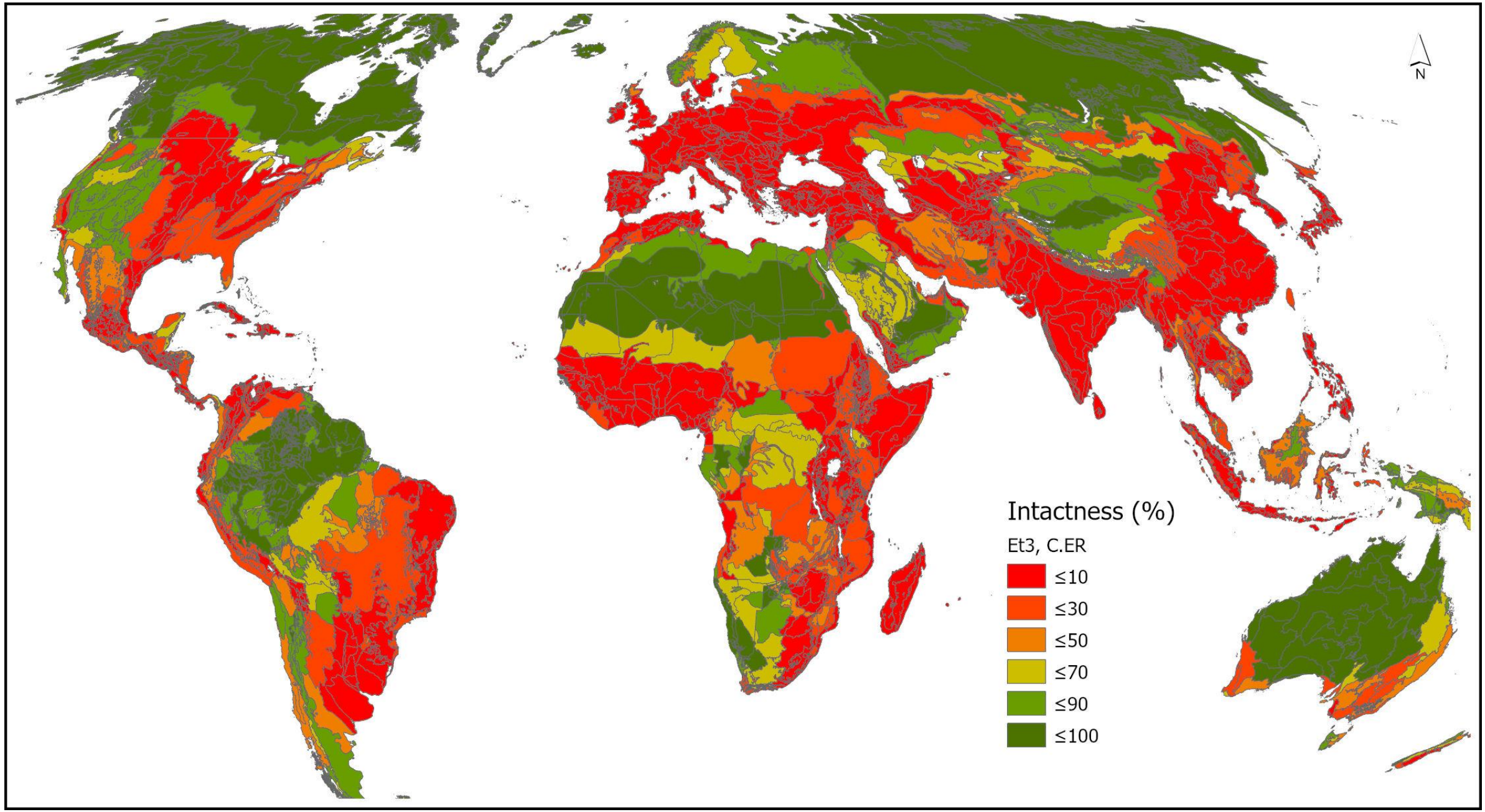
Regenerate 12-17 M km^2 in Ag. to:
- support food production
- mitigate climate
- buffer water
- support connectivity

Restore >23 M km^2 to:
- Stabilize climate
- Halt extinction losses
- Regulate hydrological flows

Reduce pressures on biodiversity in Ag.

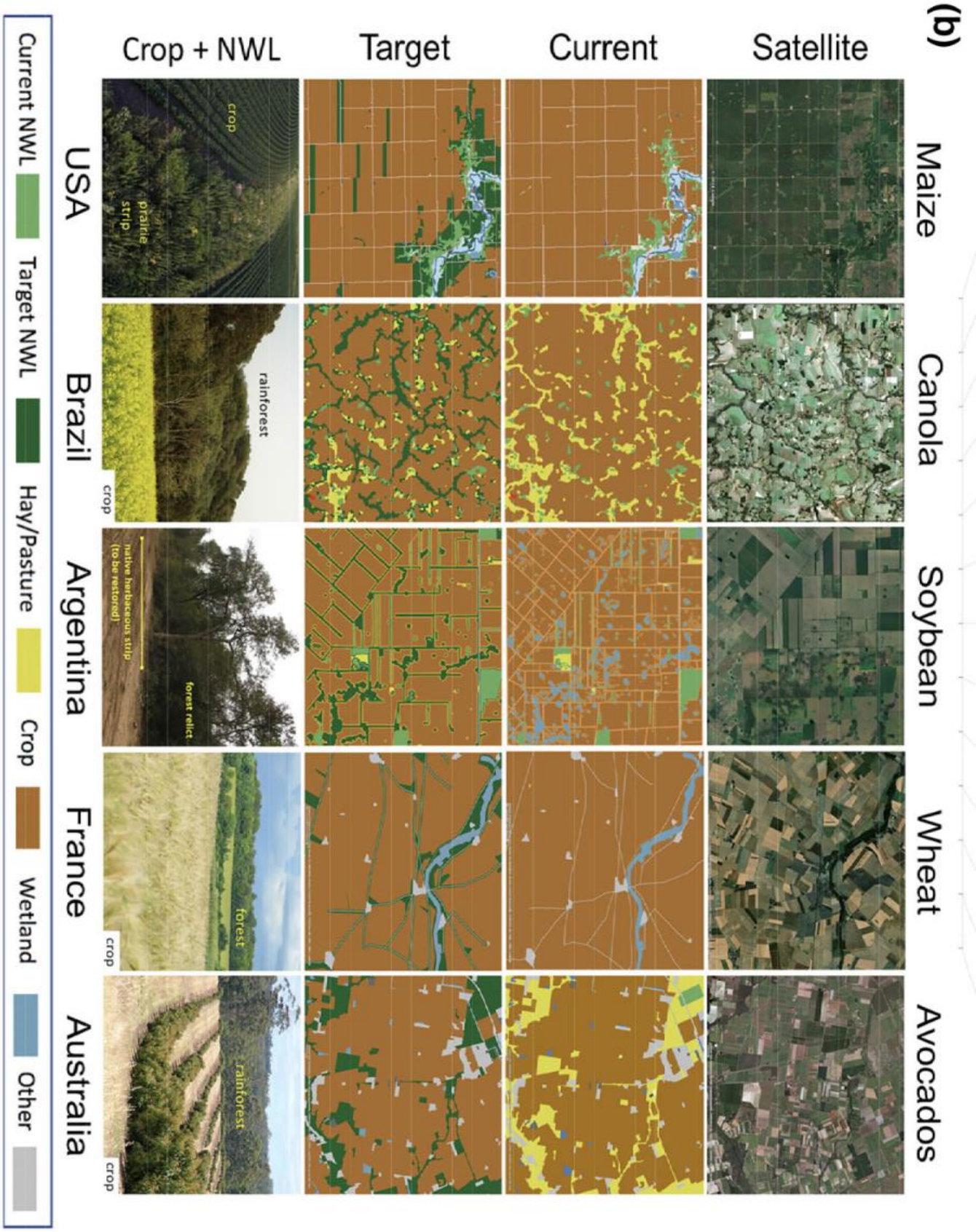
Transform food production in line with global goals

Sources:
Maron, M., Simmonds, J.S. and Watson, J.E., 2018. Bold nature retention targets are essential for the global environment agenda. *Nature Ecology & Evolution*, *2*(8), pp.1194-1195.
DeClerck, F., Jones, S., Estrada-Carmona, N. and Fremier, A., 2021. Spare half, share the rest: A revised planetary boundary for biodiversity intactness and integrity.
SBTN. 2020. Interim Guidance for Nature.

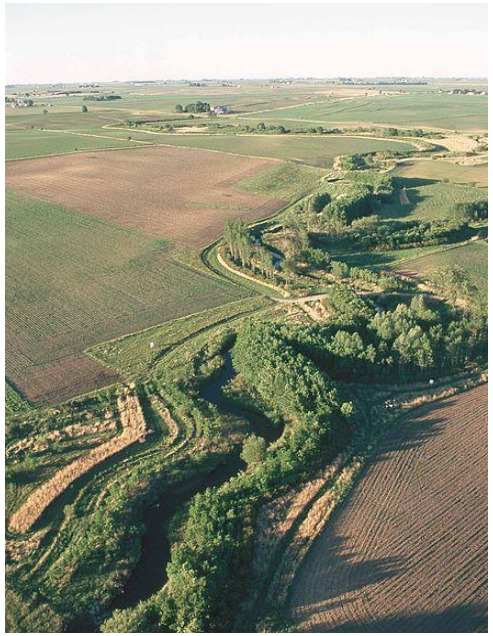

N
Intactness (%)
Et3, C.ER
≤10
≤30
≤50
≤70
≤90
≤100

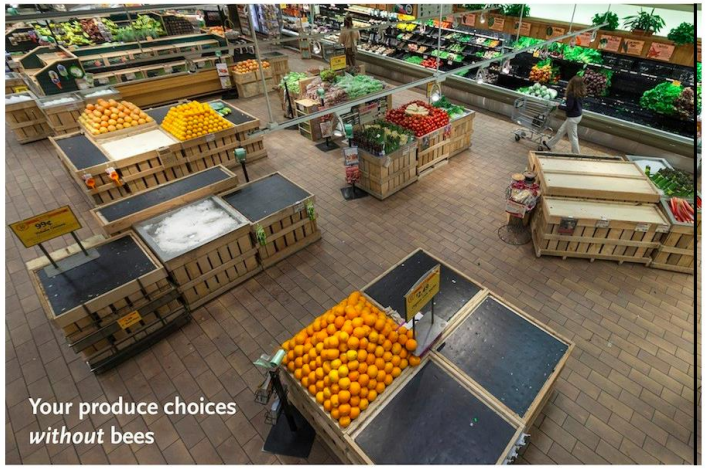
Working landscapes need at least 20% native habitat

Lucas A. Garibaldi[1,2] | Facundo J. Oddi[1,2] | Fernando E. Miguez[3] | Ignasi Bartomeus[4] | Michael C. Orr[5] | Esteban G. Jobbágy[6,7] | Claire Kremen[8] | Lisa A. Schulte[9] | Alice C. Hughes[10] | Camilo Bagnato[1,2] | Guillermo Abramson[11] | Peter Bridgewater[12,13] | Dulce Gomez Carella[1,2] | Sandra Díaz[14,15] | Lynn V. Dicks[16,17] | Erle C. Ellis[18] | Matías Goldenberg[1,2] | Claudia A. Huaylla[1,2] | Marcelo Kuperman[11] | Harvey Locke[19] | Zia Mehrabi[8,20] | Fernanda Santibañez[1,2] | Chao-Dong Zhu[5]



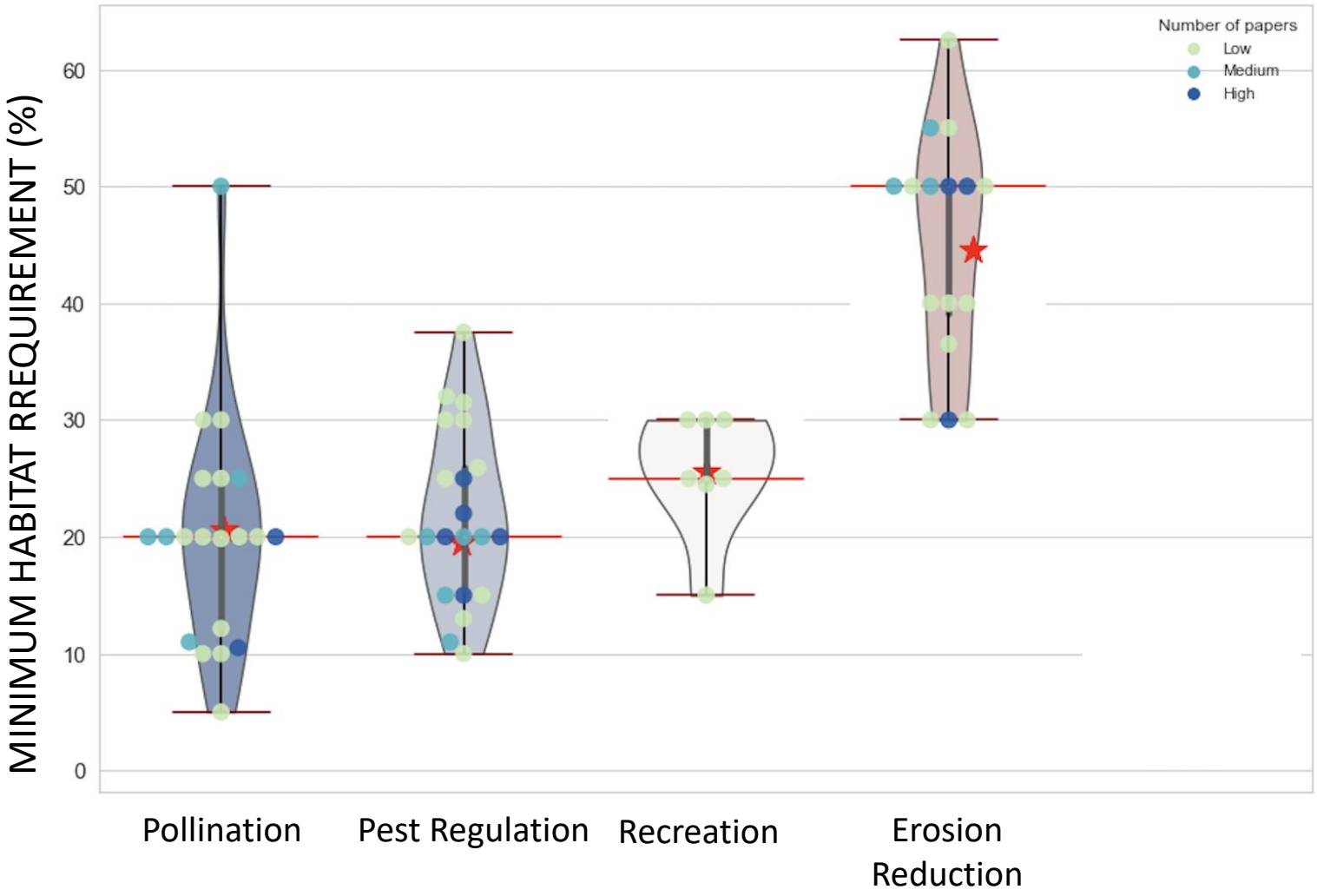
Agroecology, *as an ecological science, focuses on the contribution of* ***biodiversity*** *on enhancing the generation of ecosystem services to and from agriculture with the aim of* ***regenerating*** *these services. Diversification, agroecological, or regenerative agricultural practices are overlapping and include a diversity of management options from fields to landscapes.*



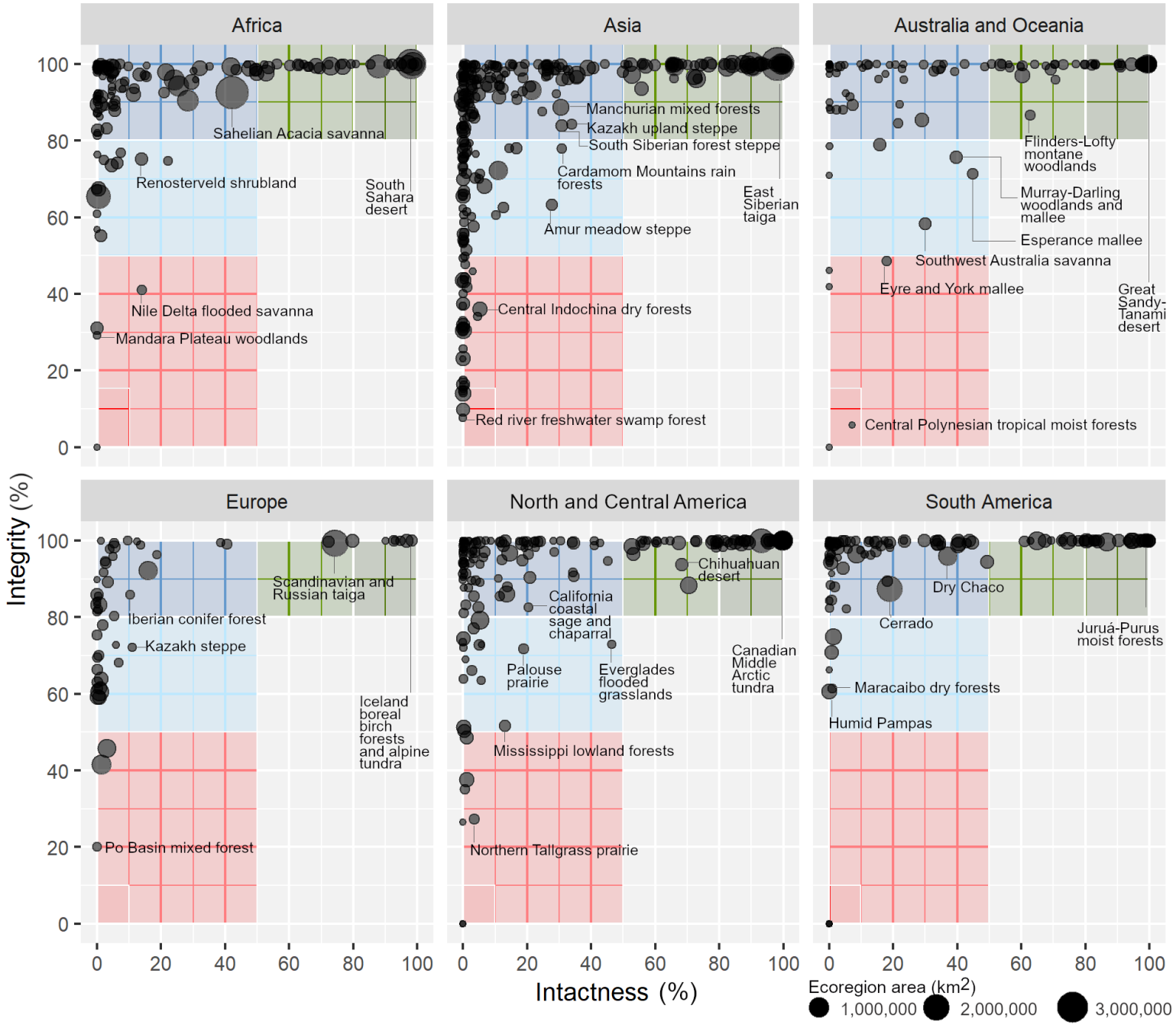


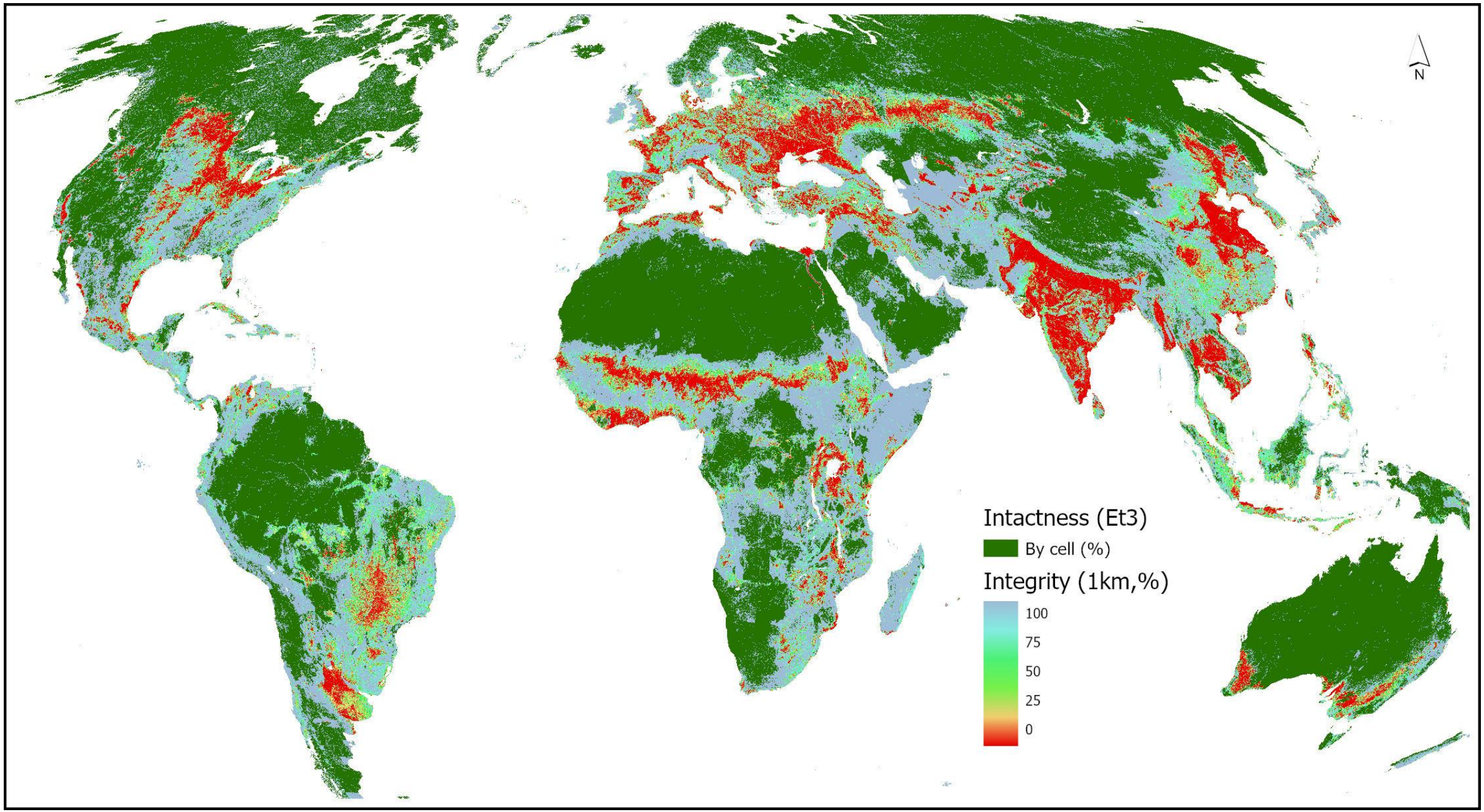
How do ES Decay with Distance?

nitrogen fixation [0.1-1 m]
reduce sediment loss [1-10 m]
pollination [10-1000 m]
pest control [10-1000 m]



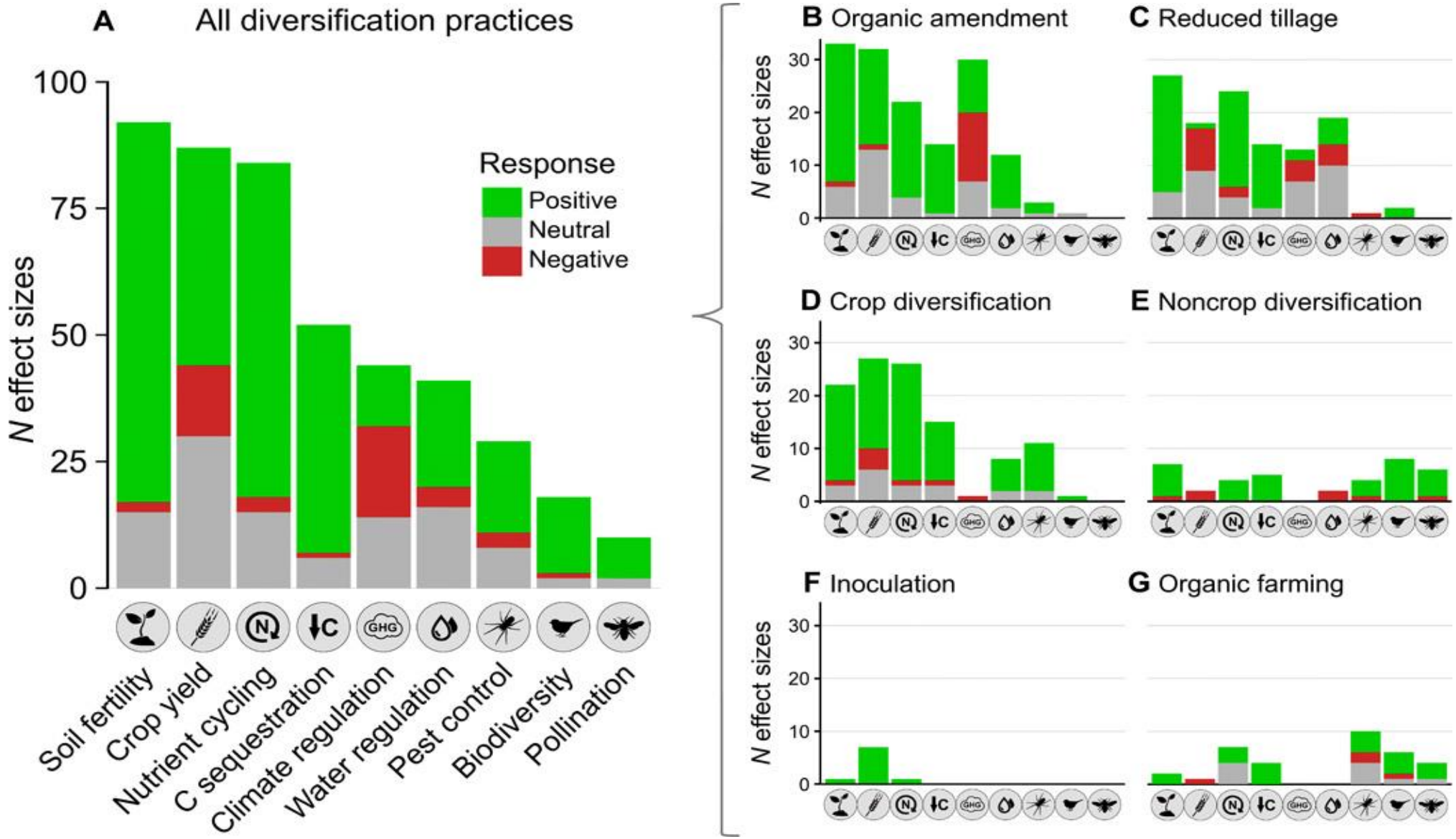
Muhamed, DeClerck, Verburg, Obura et al. In Prep. EARTH Commission Biosphere Group


Africa
Asia
Australia and Oceania
Europe
North and Central America
South America
Integrity (%)
Intactness (%)
0
20
40
60
80
100
Sahelian Acacia savanna
Renosterveld shrubland
South Sahara desert
Nile Delta flooded savanna
Mandara Plateau woodlands
Manchurian mixed forests
Kazakh upland steppe
South Siberian forest steppe
Cardamom Mountains rain forests
East Siberian taiga
Amur meadow steppe
Central Indochina dry forests
Red river freshwater swamp forest
Flinders-Lofty montane woodlands
Murray-Darling woodlands and mallee
Esperance mallee
Southwest Australia savanna
Eyre and York mallee
Great Sandy-Tanami desert
Central Polynesian tropical moist forests
Scandinavian and Russian taiga
Iberian conifer forest
Kazakh steppe
Iceland boreal birch forests and alpine tundra
Po Basin mixed forest
Chihuahuan desert
California coastal sage and chaparral
Palouse prairie
Everglades flooded grasslands
Canadian Middle Arctic tundra
Mississippi lowland forests
Northern Tallgrass prairie
Dry Chaco
Cerrado
Juruá-Purus moist forests
Maracaibo dry forests
Humid Pampas
Ecoregion area (km2)
1,000,000
2,000,000
3,000,000


N
Intactness (Et3)
By cell (%)
Integrity (1km,%)
100
75
50
25
0

Agricultural diversification promotes multiple ecosystem services without compromising yield

GIOVANNI TAMBURINI, RICCARDO BOMMARCO, THOMAS CHERICO WANGER, CLAIRE KREMEN, MARCEL G. A. VAN DER HEIJDEN, MATT LIEBMAN, AND SARA HALLIN Authors Info & Affiliations



Tamburini *et al.*, *Sci. Adv.* 2020; **6** : eaba1715 4 November 2020

Agricultural diversification promotes multiple ecosystem services without compromising yield

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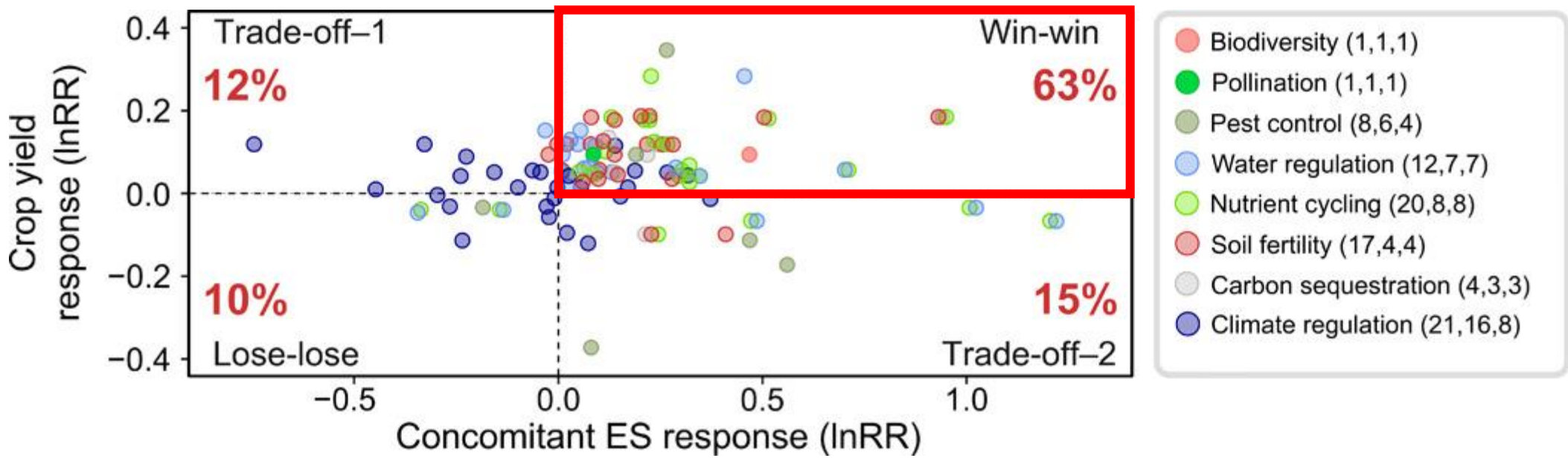


Biodiversity and Agriculture:
Rapid Evidence Review

Fabrice A.J. DeClerck, Izabella Koziell, Aman Sidhu, Jonathan Wirths, Tim Benton, Lucas A. Garibaldi,
Claire Kremen, Martine Maron, Cristina Rumbaitis del Rio, Michael Clark, Chris Dickens, Natalia Estrada-Carmona,
Alexander K. Fremier, Sarah K. Jones, Colin K. Khoury, Rattan Lal, Michael Obersteiner, Roseline Remans,
Adrien Rusch, Lisa A. Schulte, Jeremy Simmonds, Lindsay C. Stringer, Christopher Weber, and Leigh Winowiecki.

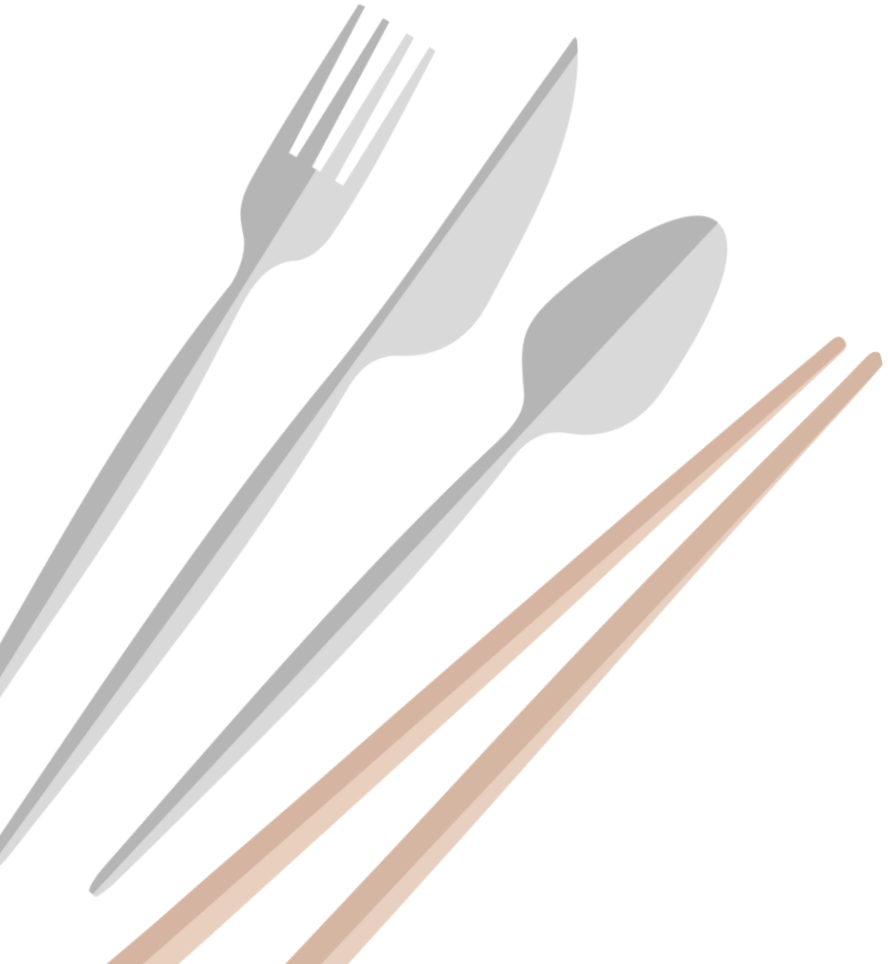
Foreign, Commonwealth
& Development Office

Regenerative agricultural practices can generate additional critical ecosystem services by maintaining biodiversity in agricultural lands. ***At scale, these practices offer the potential to sequester 4.3-6.9 Gt CO_2e year^{-1}*** ***[Medium Agreement, Medium Evidence],*** ***create 12- 17 M km^2 habitat for biodiversity*** ***[High Agreement, High Evidence]*** ***and increase connectivity for biodiversity*** ***[High Agreement, Limited Evidence].*** ***There is no evidence that diversified production systems compromise food security – many agricultural diversification practices provide multiple complementary benefits*** ***[High Agreement, High Evidence].***

https://cgspace.cgiar.org/handle/10568/114703

Target 1 – Healthy Diets

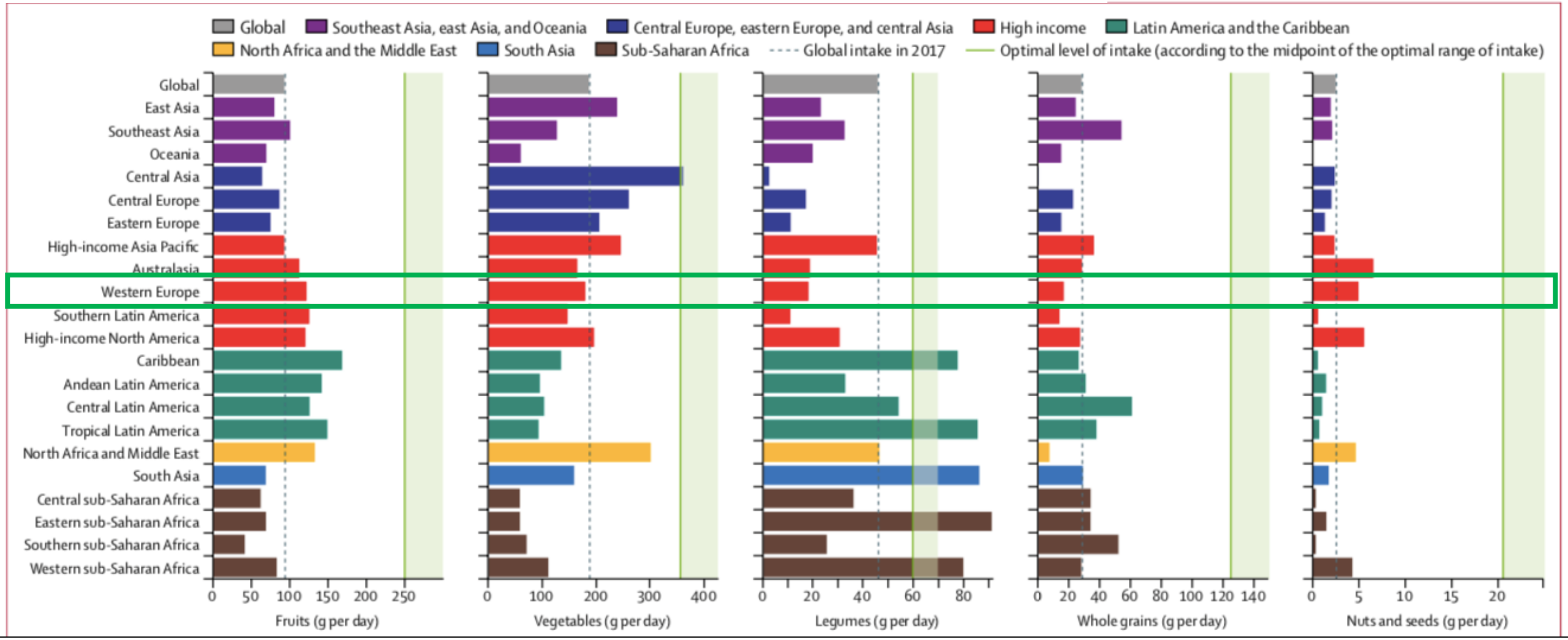
2500 kcal/day



	Macronutrient intake grams per day (possible range)	Caloric intake kcal per day
Whole grains		
Rice, wheat, corn and other	**232**	**811**
Tubers or starchy vegetables		
Potatoes and cassava	**50** (0–100)	**39**
Vegetables		
All vegetables	**300** (200–600)	**78**
Fruits		
All fruits	**200** (100–300)	**126**
Dairy foods		
Whole milk or equivalents	**250** (0–500)	**153**
Protein sources		
Beef, lamb and pork	**14** (0–28)	**30**
Chicken and other poultry	**29** (0–58)	**62**
Eggs	**13** (0–25)	**19**
Fish	**28** (0–100)	**40**
Legumes	**75** (0–100)	**284**
Nuts	**50** (0–75)	**291**
Added fats		
Unsaturated oils	**40** (20–80)	**354**
Saturated oils	**11.8** (0-11.8)	**96**
Added sugars		
All sugars	**31** (0–31)	**120**

Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017

*GBD 2017 Diet Collaborators**



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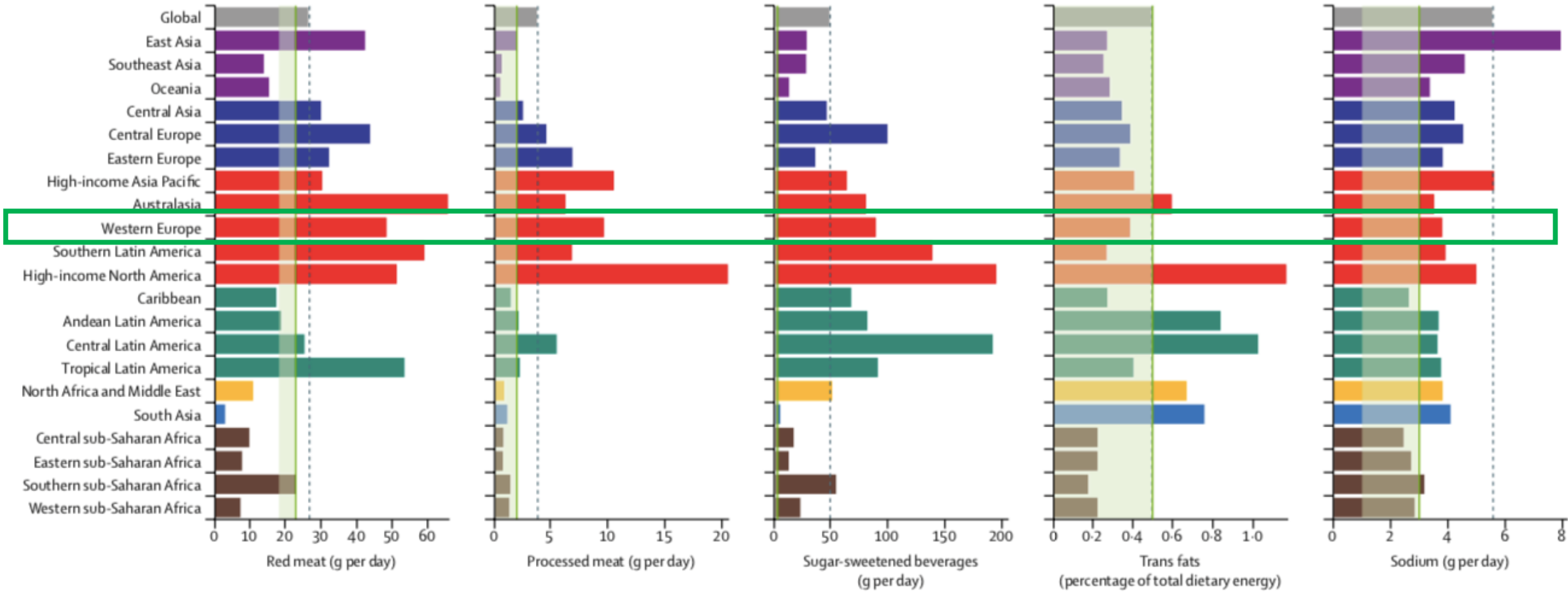
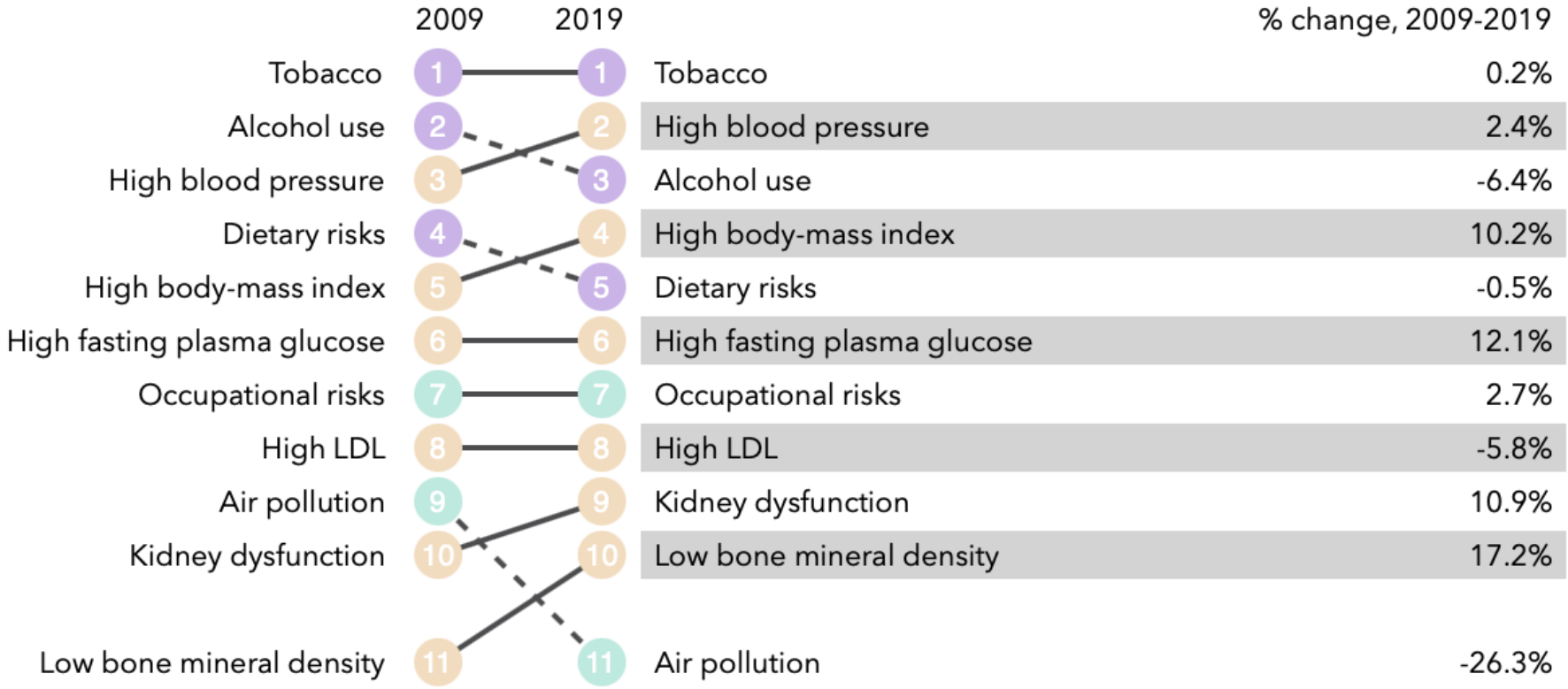


What risk factors drive the most death and disability combined?

- Metabolic risks
- Environmental/occupational risks
- Behavioral risks



IHME
Measuring what matters

www.healthdata.org

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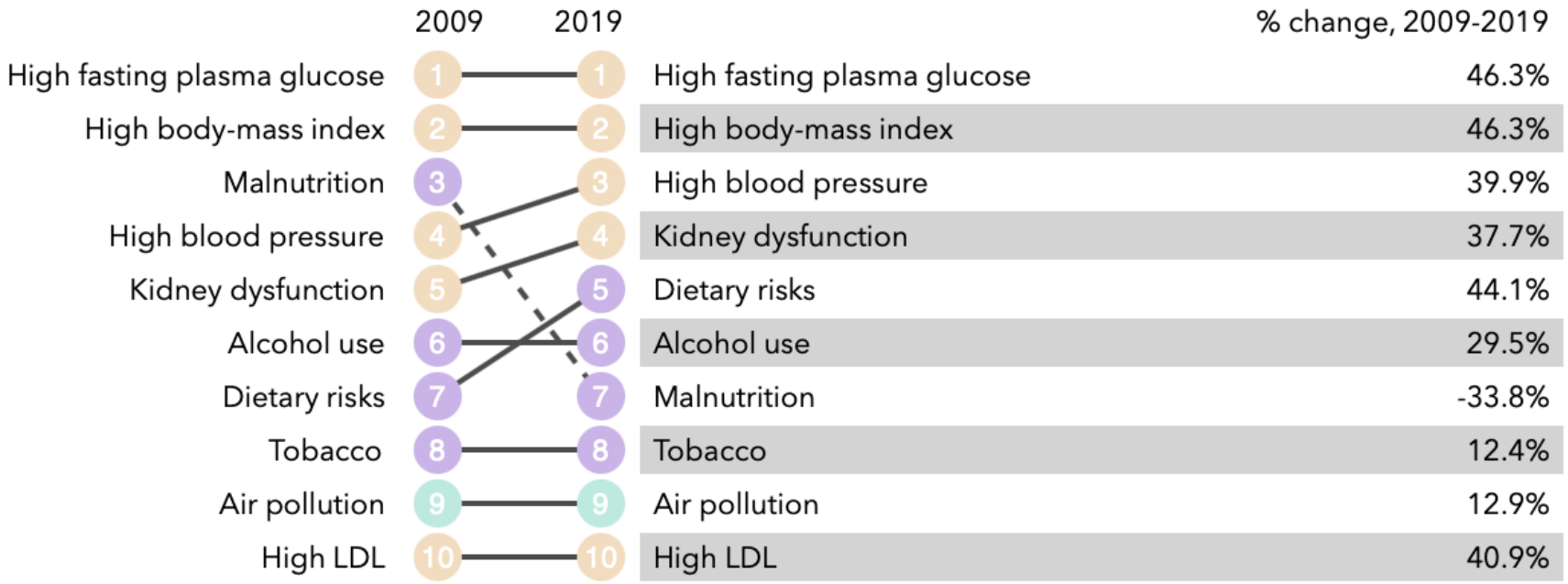

	% change, 2009-2019
High fasting plasma glucose	46.3%
High body-mass index	46.3%
High blood pressure	39.9%
Kidney dysfunction	37.7%
Dietary risks	44.1%
Alcohol use	29.5%
Malnutrition	-33.8%
Tobacco	12.4%
Air pollution	12.9%
High LDL	40.9%

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Measuring what matters

www.healthdata.org