Agroecological and other systemic technological innovations

Fergus Sinclair

Project team leader CFS, HLPE report (2019) on agroecological and other innovative approaches

CFS COMMITTEE ON WORLD FOOD SECURITY

HLPE High Level Panel of Experts

World Agroforestry

CIFOR

CGIAR

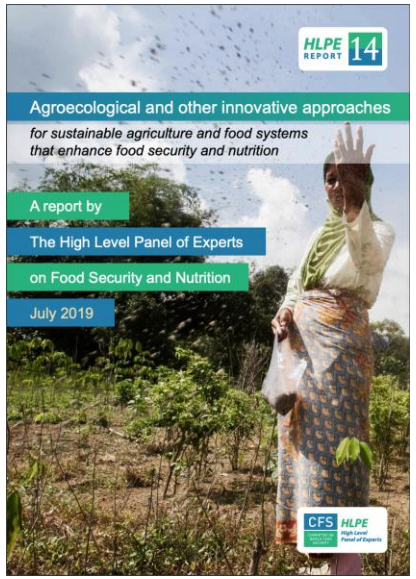
RESEARCH PROGRAM ON Forests, Trees and Agroforestry

PRIFYSGOL BANGOR UNIVERSITY

Five topics

- Fundamentals of agroecology
- Agroecology and other ‘systemic’ approaches: analogies and differences
- Systemic approaches and complementarities (discrepancies) with digital technologies and biotech
- Perspectives and expected impacts on food and agricultural systems
- Governance issues

Transformative Partnership Platform on agroecological approaches to building resilience of livelihoods and landscapes



Advocacy and wide dissemination of new knowledge and experience to foster transformation globally

Synthesis amongst areas of work

Place-based research in development (co-creation of knowledge) with national and local partners in a series of engagement landscapes or territories

- Achieving better nutrition through connecting consumers and producers
- Sustainable and inclusive management of water resources and risks
- Fixing policies and institutions to enable adoption decisions
- Pest, disease and weed control
- 1. Evidencing socio-economic viability and understanding adoption decisions
- Inclusive cross scale metrics for agricultural systems
- Evidencing relationships between diversity and resilience
- Soil health including land restoration and avoiding degradation

National agricultural research and extension systems

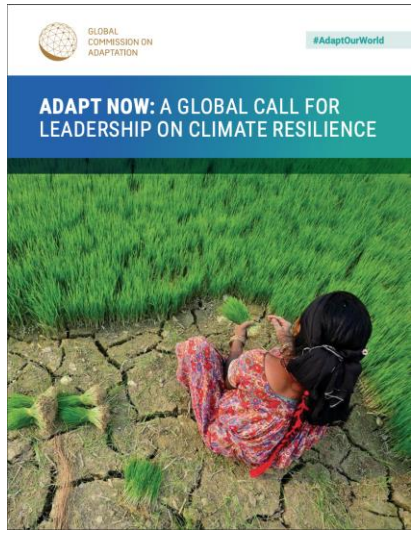
Farmer organisations, civil society and social movements

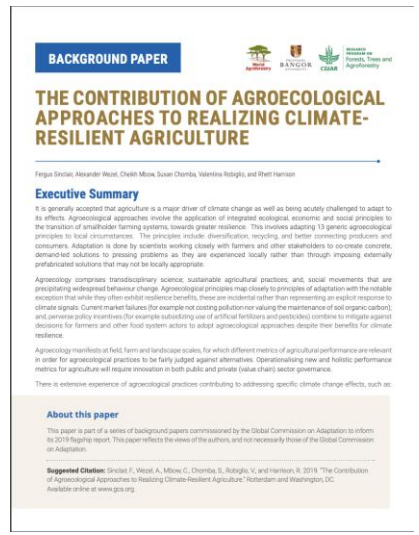
Global partners variously engaged with and some leading one or more of the interrelated priority areas of work

- UN Agencies FAO, UNEP, ILO and others
- Donors
- NGOs and Foundations eg BioVision
- FP2 Agroecology priority FTA, CIFOR, ICRAF, Catie, Bioversity, Bangor University and CIAT
- CIRAD
- Research Institutions and Universities IRD and INRAE
- Other CRPs and CGIAR centres e.g. WLE, GLDC, ICARDA, IMWI
- Private sector

Policy processes and strategic meetings on various aspects of agroecology in 2019 / 2020

CFS, HLPE[v]; GCA -BMZ[vi]; French institutes and CGIAR[viii]; FAO[ix]; Biovision/ IPES-Food roundtable[x]; IFIAD[xi]; EU Brussels briefing 59[xii]





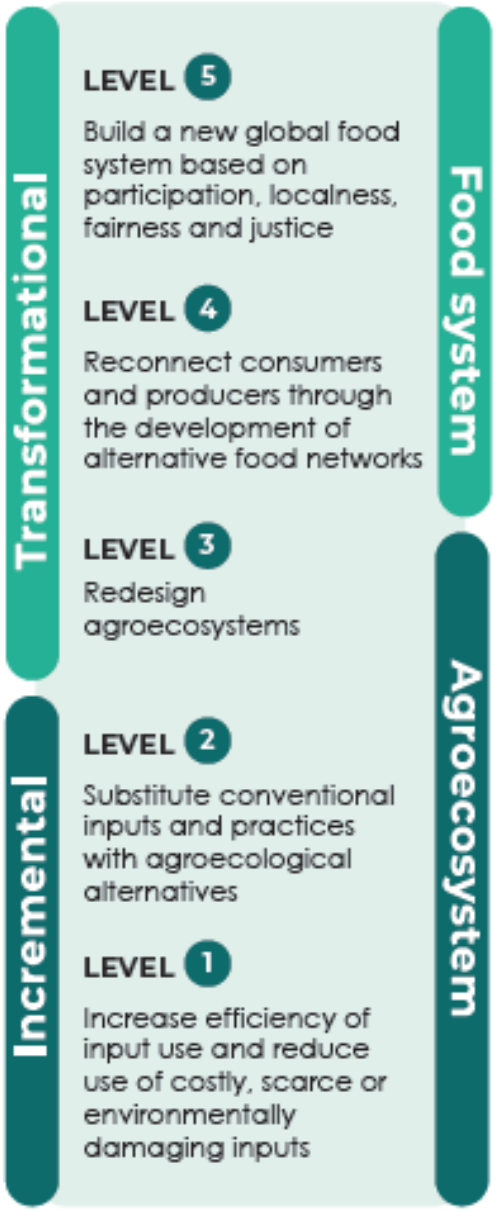
Fundamentals of Agroecology

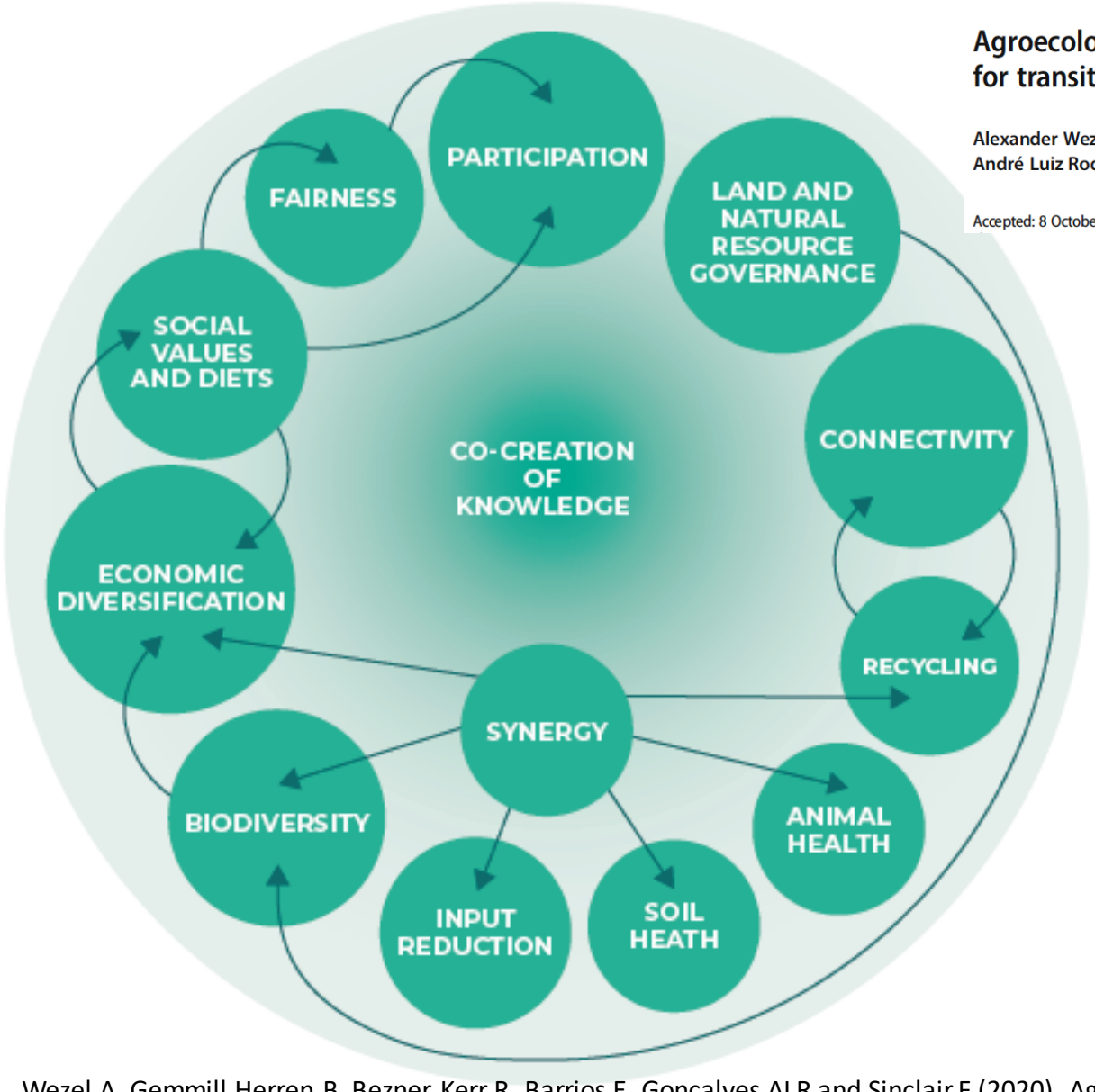
Dynamic concept,
from field and farm to whole food system:

- Science: transdisciplinary
  - Focused on real world problems; solution orientated
  - Involves stakeholders
  - Reflexive method development
- Set of practices:
  - harness ecological processes (biodiversity) rather than forcing agricultural and food systems with external inputs
  - generic principles, applied locally - no prescribed se → diversity
- Social movements: political, assert collective rights, advocate diversity in agriculture and food systems, transformation at scale

https://www.bondproject.eu/outstanding-practices-in-agroecology-2019-announced/

Principles and transition levels





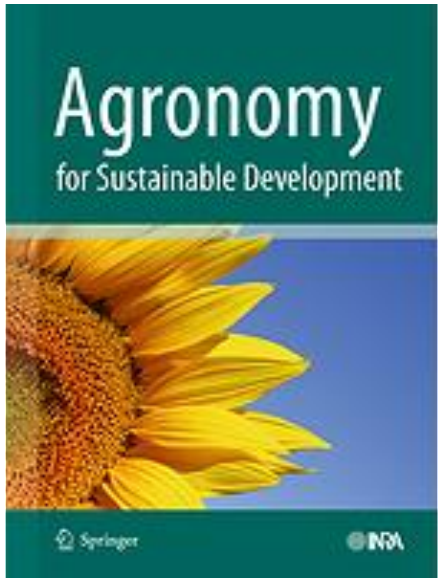
Agronomy for Sustainable Development (2020) 40:40
https://doi.org/10.1007/s13593-020-00646-z

REVIEW ARTICLE

Agroecological principles and elements and their implications for transitioning to sustainable food systems. A review

Alexander Wezel[1] · Barbara Gemmill Herren[2] · Rachel Bezner Kerr[3] · Edmundo Barrios[4] · André Luiz Rodrigues Gonçalves[5] · Fergus Sinclair[6,7]

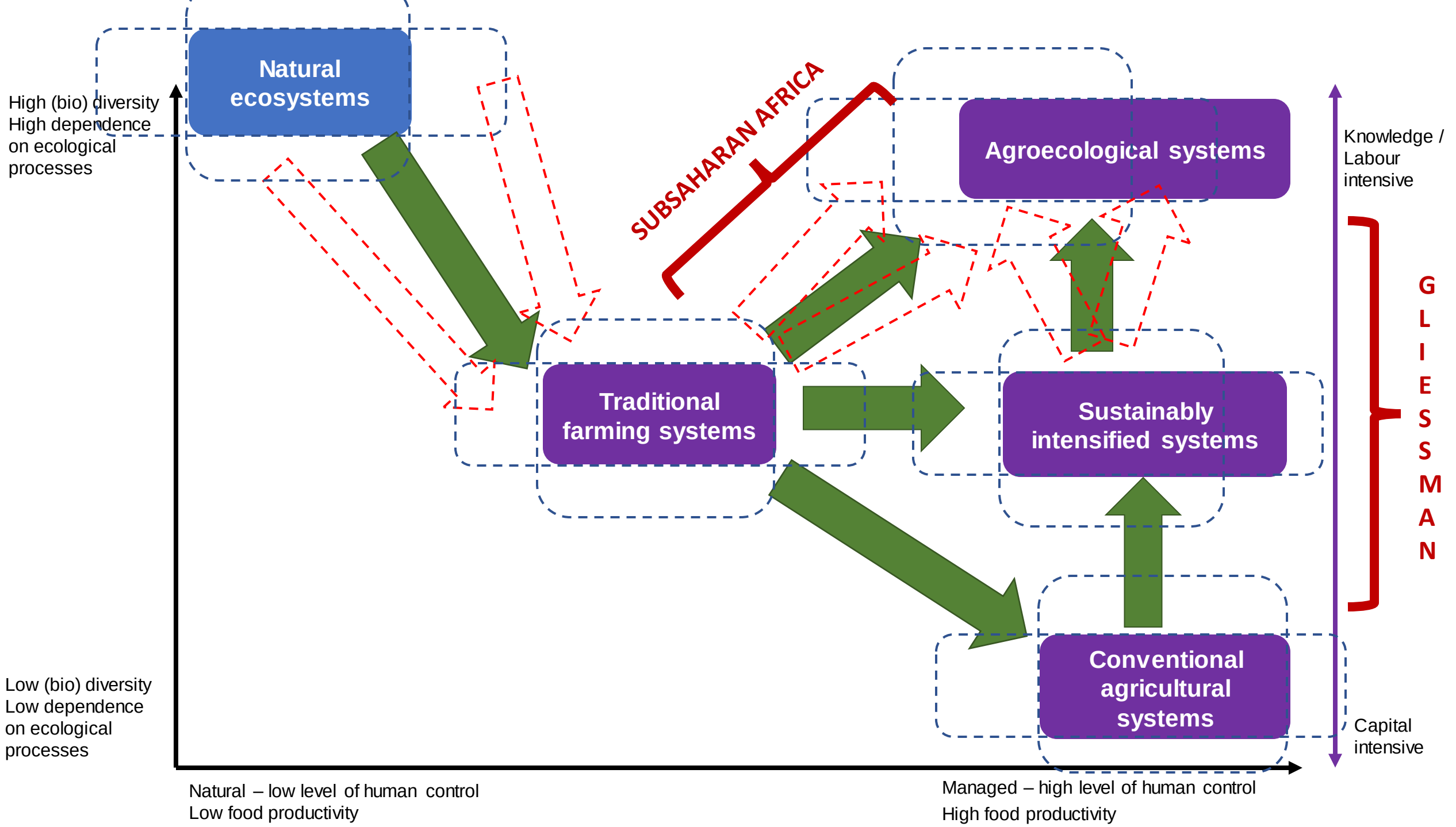
Accepted: 8 October 2020

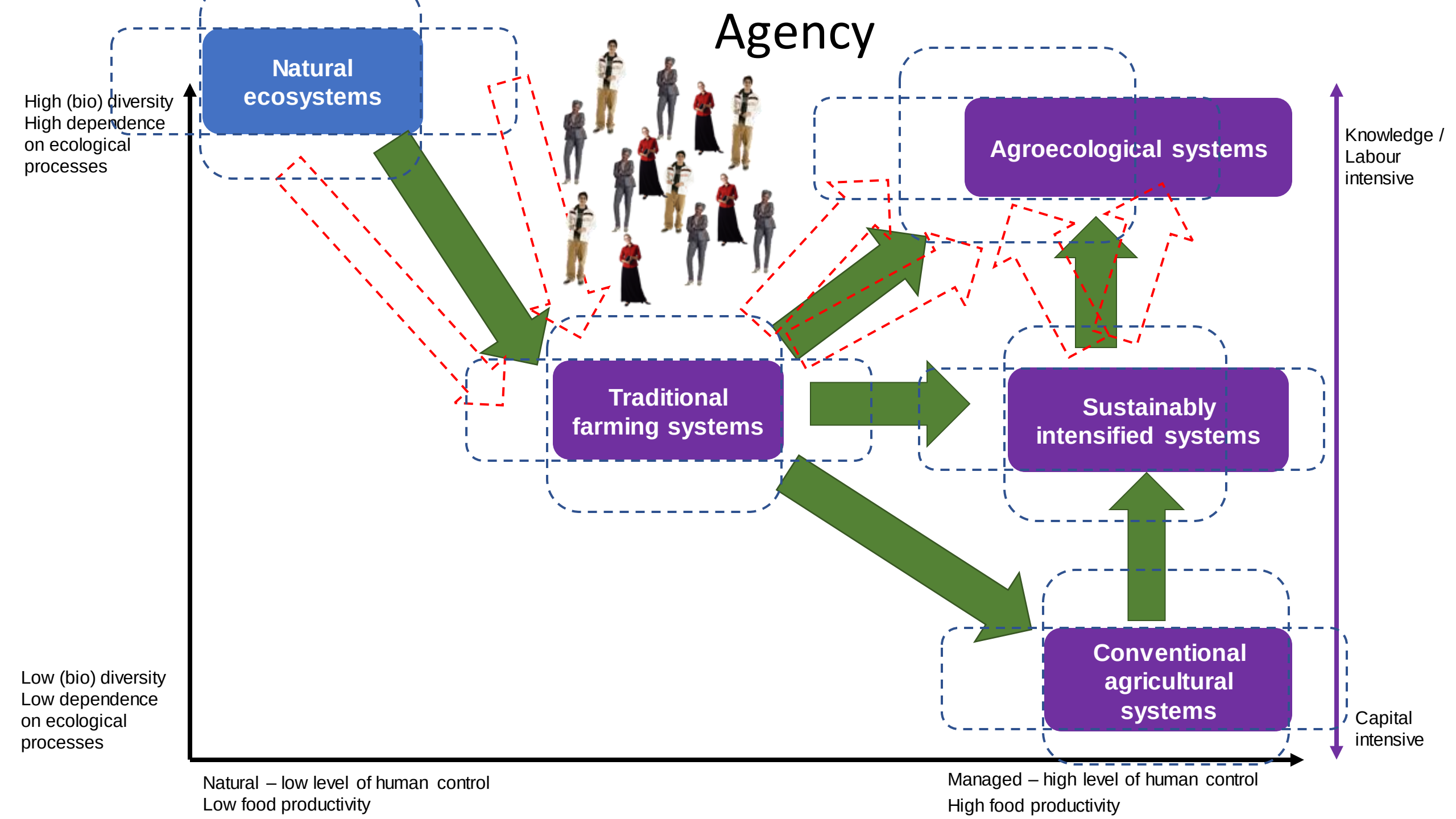


FAO Elements – entry points

HLPE Principles – characterisation and analysis

Wezel A, Gemmill Herren B, Bezner Kerr R, Barrios E, Gonçalves ALR and Sinclair F (2020). Agroecological principles and elements and their implications for transitioning to sustainable food systems. A review. *Agronomy for Sustainable Development* **40:** 40 13pp.


Natural ecosystems
SUBSAHARAN AFRICA
Agroecological systems
Traditional farming systems
Sustainably intensified systems
Conventional agricultural systems
High (bio) diversity
High dependence on ecological processes
Low (bio) diversity
Low dependence on ecological processes
Knowledge / Labour intensive
Capital intensive
GLIESSMAN
Natural – low level of human control
Low food productivity
Managed – high level of human control
High food productivity


Agency
Natural ecosystems
Agroecological systems
Traditional farming systems
Sustainably intensified systems
Conventional agricultural systems
High (bio) diversity
High dependence on ecological processes
Low (bio) diversity
Low dependence on ecological processes
Knowledge / Labour intensive
Capital intensive
Natural – low level of human control
Low food productivity
Managed – high level of human control
High food productivity

CFS COMMITTEE ON WORLD FOOD SECURITY 46

Innovation for Transformation

Involves challenging the *status quo* (rules, institutions, practices).

How change happens (the process of innovation) is as important as the specific changes (innovations) that result:

- New technology, markets and institutions: emphasis now on democratizing and responsible innovation hence co-creation of knowledge.
- Innovation in agriculture is inherently localized.
- Approaches = widely practiced sets of principles and methods that foster the transition towards SFS for FSN, within an overarching philosophy and strategic vision for the future.
- Principles = statements which form a basis for a system of belief or reasoning which guide decisions and behaviour.
  - Either normative or causative
  - Need to be fully explicit

Established science can re-inforce lock-ins!

EDITORIAL · 12 OCTOBER 2020

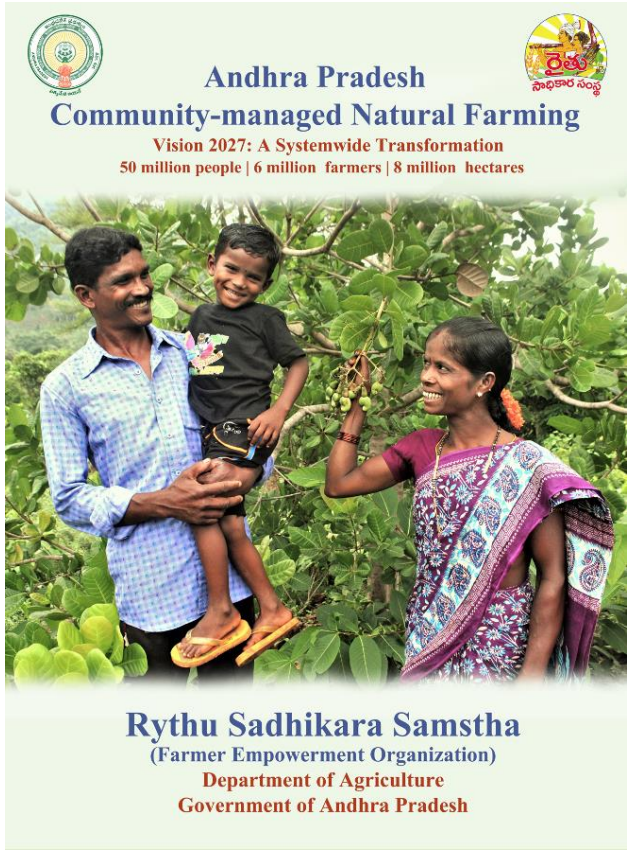
Ending hunger: science must stop neglecting smallholder farmers

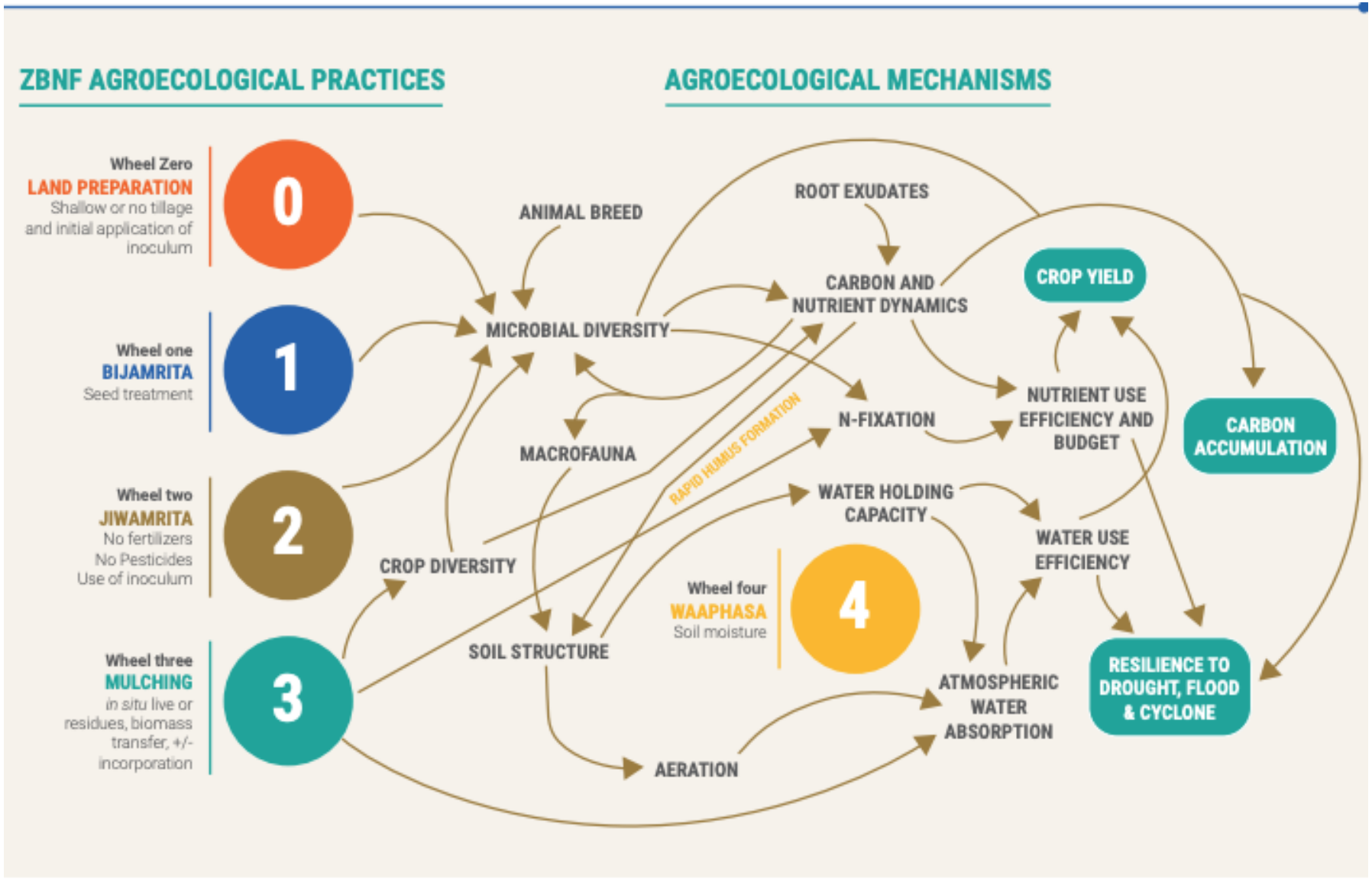
Policymakers urgently need ideas on ways to end hunger. But a global review of the literature finds that most researchers have had the wrong priorities.

Plugging the gap between rhetoric calling for transformation and action to enbale it

Laborde, D., Murphy, S., Parent, M., Porciello, J. & Smaller C. (2020). *Ceres2030: Sustainable Solutions to End Hunger - Summary Report.* Cornell University, IFPRI and IISD.

Contested evidence – social movements and established science



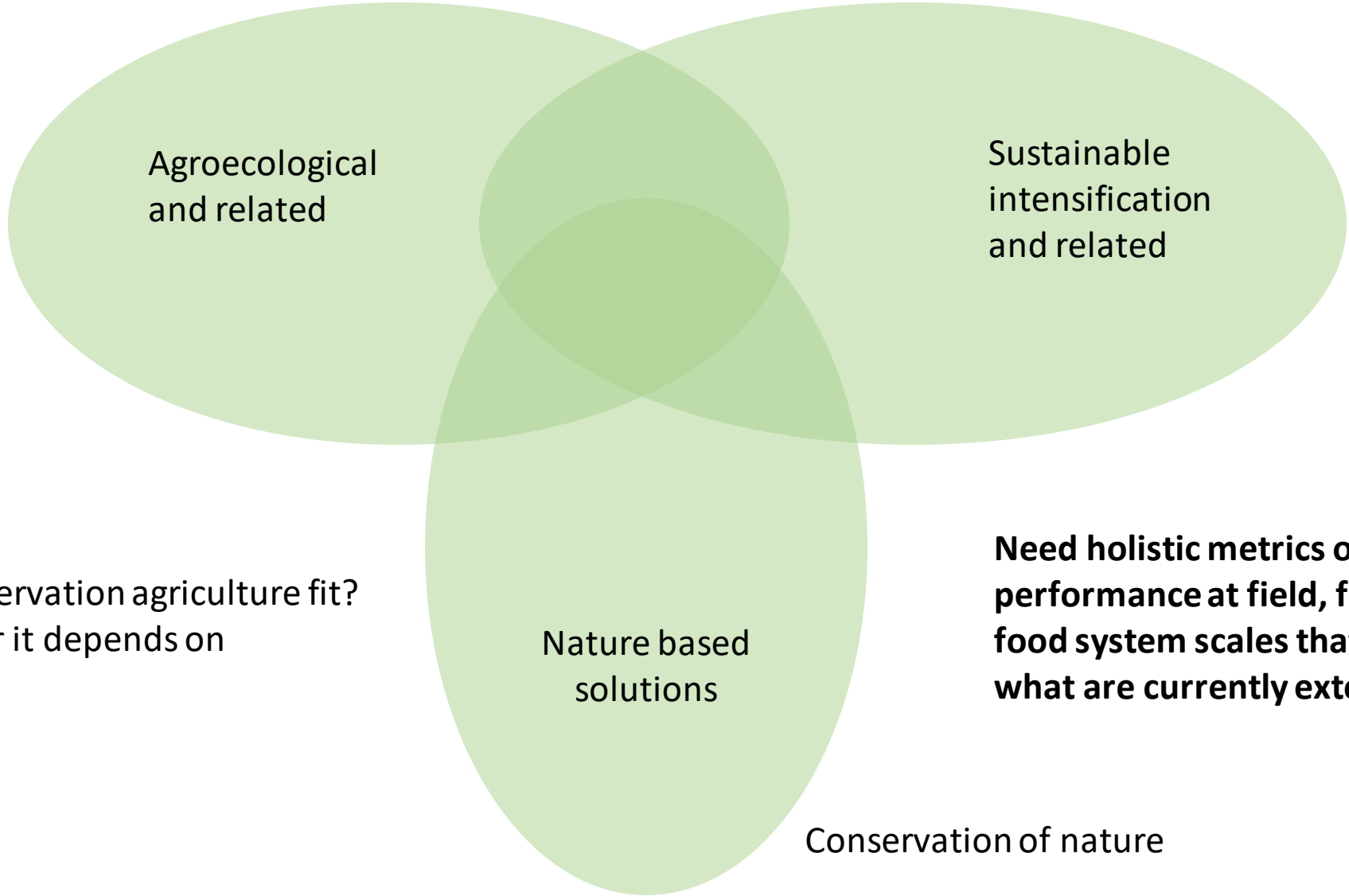


Line drawing: ionlinedocotor.com

Analysis based on principles allows us to understand overlap and distinctions amongst approaches

Farming in harmony with nature

Intensify as efficiently as possible

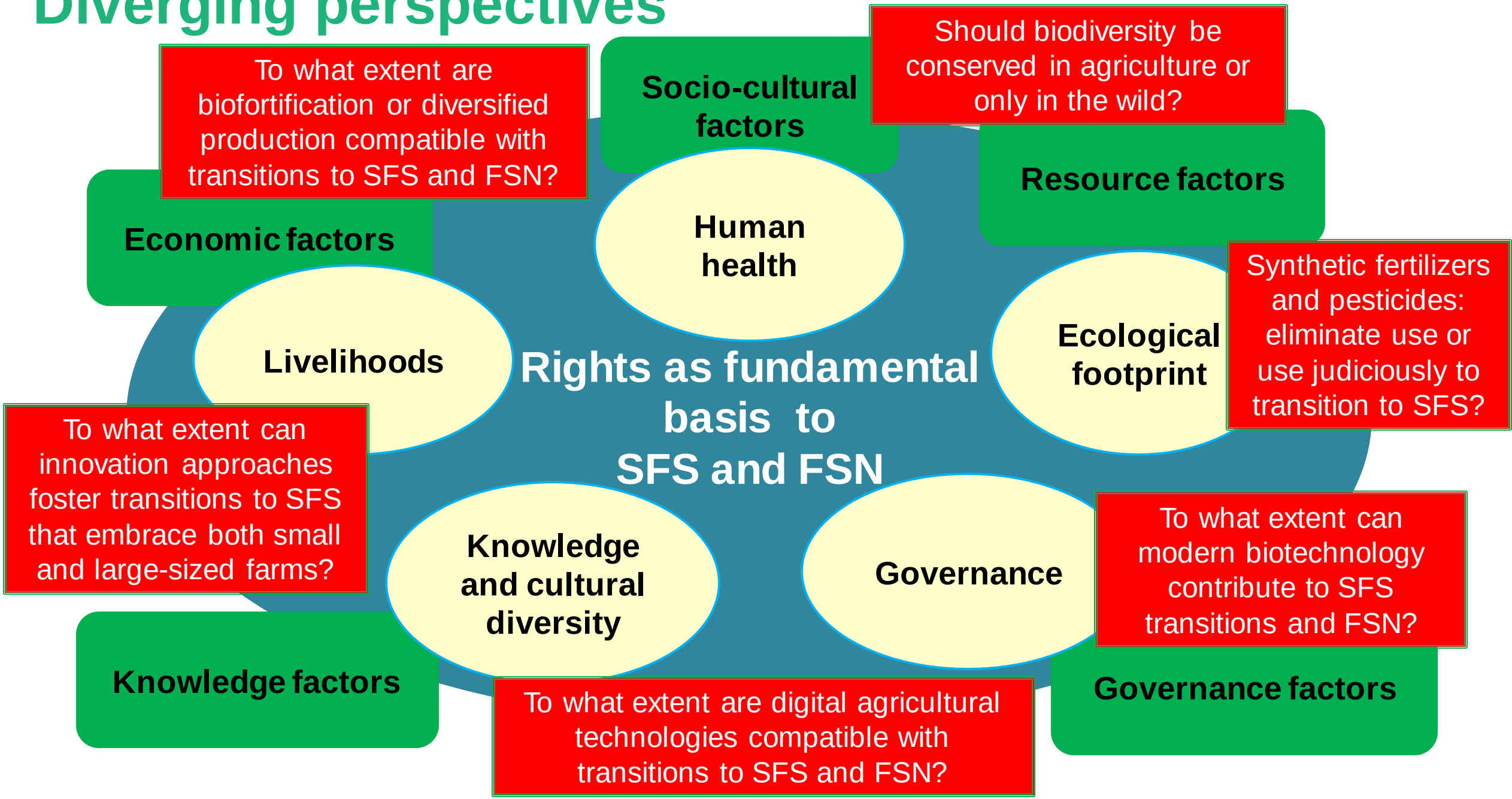


Where does conservation agriculture fit? Depends whether it depends on herbicides or not.

Need holistic metrics of agricultural performance at field, farm, landscape and food system scales that take account of what are currently externalities

Characteristic	Food sovereignty	Agroecological and related approaches				Sustainable intensification and related approaches			
		Agro-ecology	Organic Agriculture	Agroforestry	Permaculture	Sustainable intensification	Climate smart agriculture	Nutrition sensitive agriculture	Sustainable food value chains
Resource efficiency									
Regenerative production, Recycling and Efficiency								(not relevant)	(not relevant)
Synergies/Diversity/Integration									
Resilience									
Diversification									
Climate adaptation and mitigation									
Social equity/responsibility									
Knowledge generation and technology transfer									
Human and social values, equity									
Human and social values, focus on labor vs. capital									
Connectivity- value chains/circular economies									
Governance- rights, democratization and participation									

Diverging perspectives



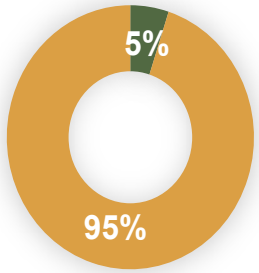
What was learnt from analyzing diverging perspectives

- Divergence more around **how** technology is accessed, **used and controlled** rather than the fundamental nature of technologies themselves
- **Moralization** of food
  increases motivation of policy makers to act
  but makes it more difficult for this to be done on the basis of evidence
- There is **need for clarity** on asserting *normative starting points* for transitioning to SFS for FSN *and then causative mechanisms* to **achieve transitions in different contexts**
- **Understanding the basis and nature of controversies**
  helps **get beyond divisions**
- **Agroecology is** not anti-technology, anti-science, or anti-private sector but **a modern response to today's challenges – being considered by national governments**

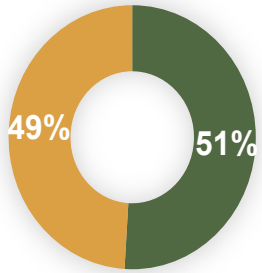
NITI-Aayog (2020). Agroecology and Natural Farming Could Accelerate Inclusive Economic Growth in India. https://pib.gov.in/PressReleasePage.aspx?PRID=1628285

Expected impacts – need a level playing field

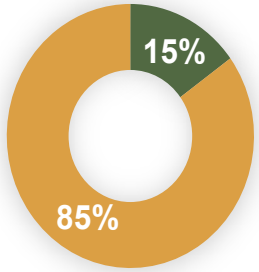
Biovision "money flows" report with IPES Food: https://www.agroecology-pool.org/moneyflowsreport/



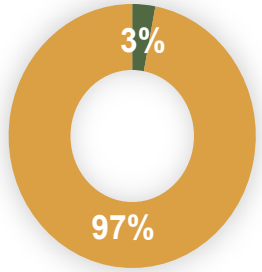
UK DFID
(Pimbert & Moeller 2018)



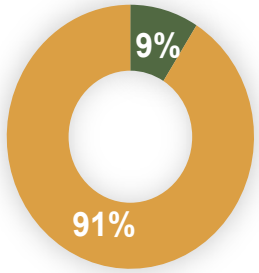
Swiss R4D



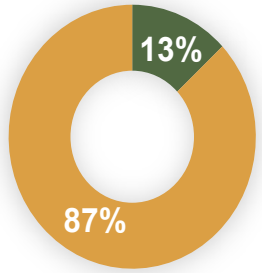
USDA
(Delonge et al. 2016)



Bill & Melinda Gates Foundation



Belgium ODA
(Coalition contre la Faim, 2020)



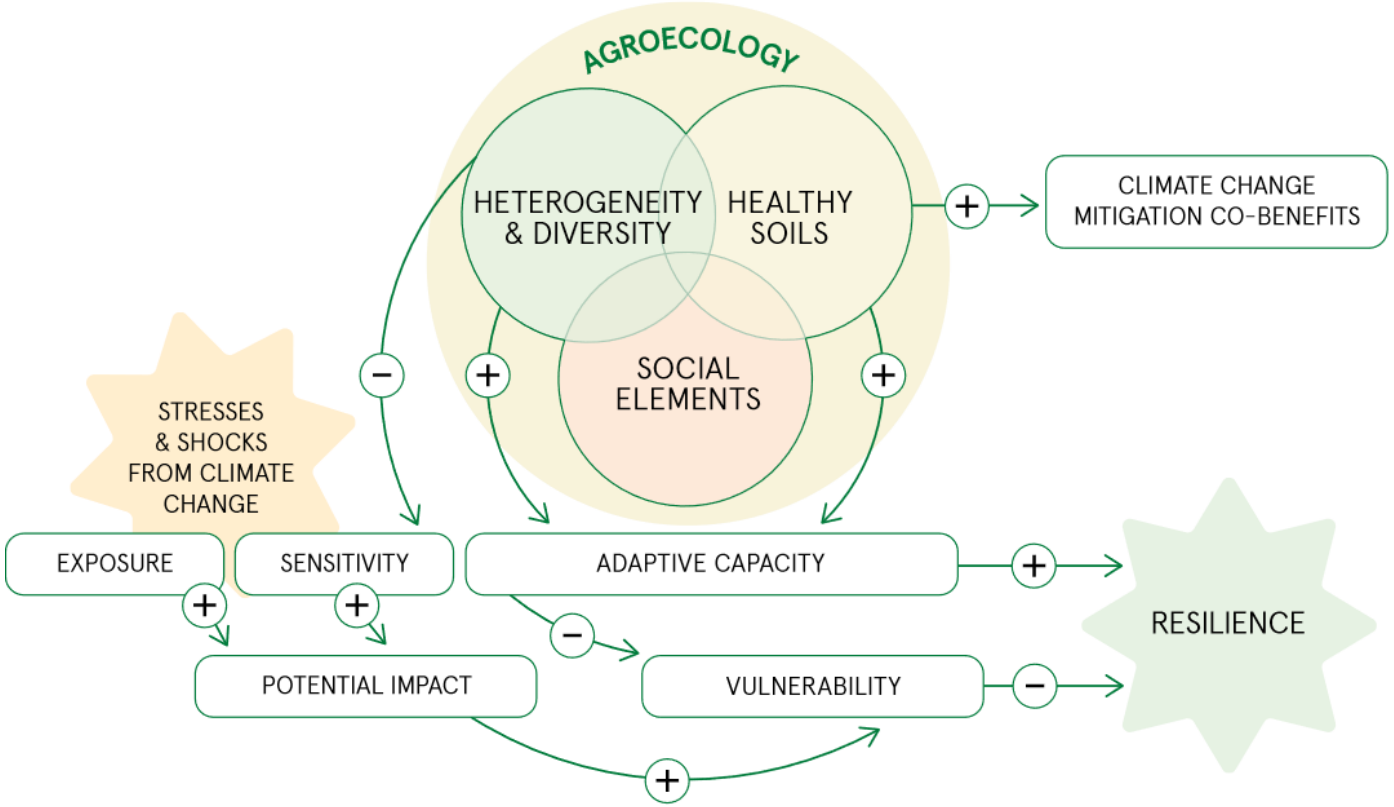
Kenya R&D

Agroecological projects

Not agroecological

Meta-analysis provides solid evidence for resilience-building potential of agroecology

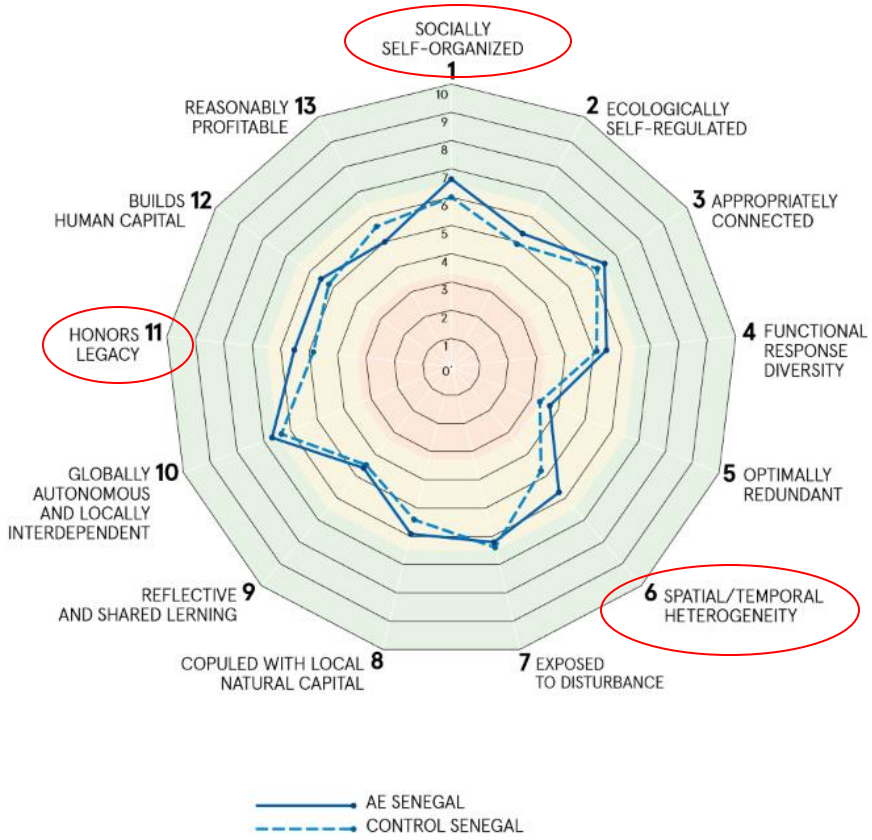
- Elements and principles of agroecology correlate strongly with resilience indicators.
- Robust evidence on agroecology's contribution to resilience, particularly through:
  - improved soil health
  - rich biodiversity
  - high diversification
- Mitigation co-benefits esp:
  - increased soil organic matter
  - reduced use of synthetic fertilizers



Biovision climate change report with FAO: https://www.agroecology-pool.org/climatechangereport/

Technical Potential in Senegal

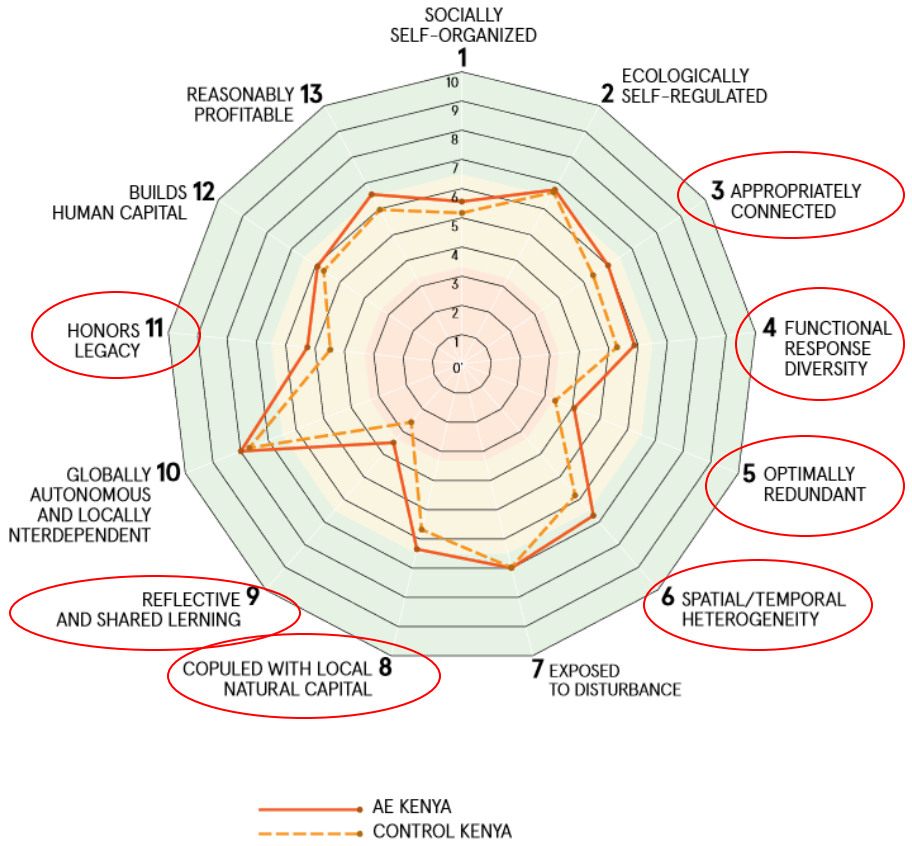
- For 3 out of 13 resilience indicators, agroecology-based systems perform significantly better.
- Agroecology scored better in on social indicators and agronomic practices.
- Barriers for agroecological farmers include access to effective biological products for pest control and weed management, as well as limited access to financial services and insurance.



Biovision climate change report with FAO: https://www.agroecology-pool.org/climatechangereport/

Technical Potential in Kenya

- For 7 out of 13 resilience indicators, agroecology-based systems performed significantly better.
- Agroecology scored better in environmental aspects, economic components and agronomic practices.
- Both agroecological and control group identified similar needs for support: insurance, animal breeding, non-farm income generating activities, access to water and land.



Biovision climate change report with FAO: https://www.agroecology-pool.org/climatechangereport/

Governance

- **Land**
  - measures overlain on uneven access to land and natural resources (e.g. REDD+) reinforce inequity; devolution of responsibilities need to go hand in hand with authority
  - need for adherence to principles of responsible land investment
- **Seeds**
  - reconciliation of quality standards and improved seed with agency of farmers
- **Water**
  - sustainable and inclusive management of water resources and risks
- **Livestock**
  - reconciling animal movement with restoration and regeneration
- **Addressing market failures and maladapted policies**
  - valuing slow variables (soil carbon); avoiding perverse incentives (e.g. fertiliser subsidy; forest legislation that discourages trees in fields and farming landscapes)

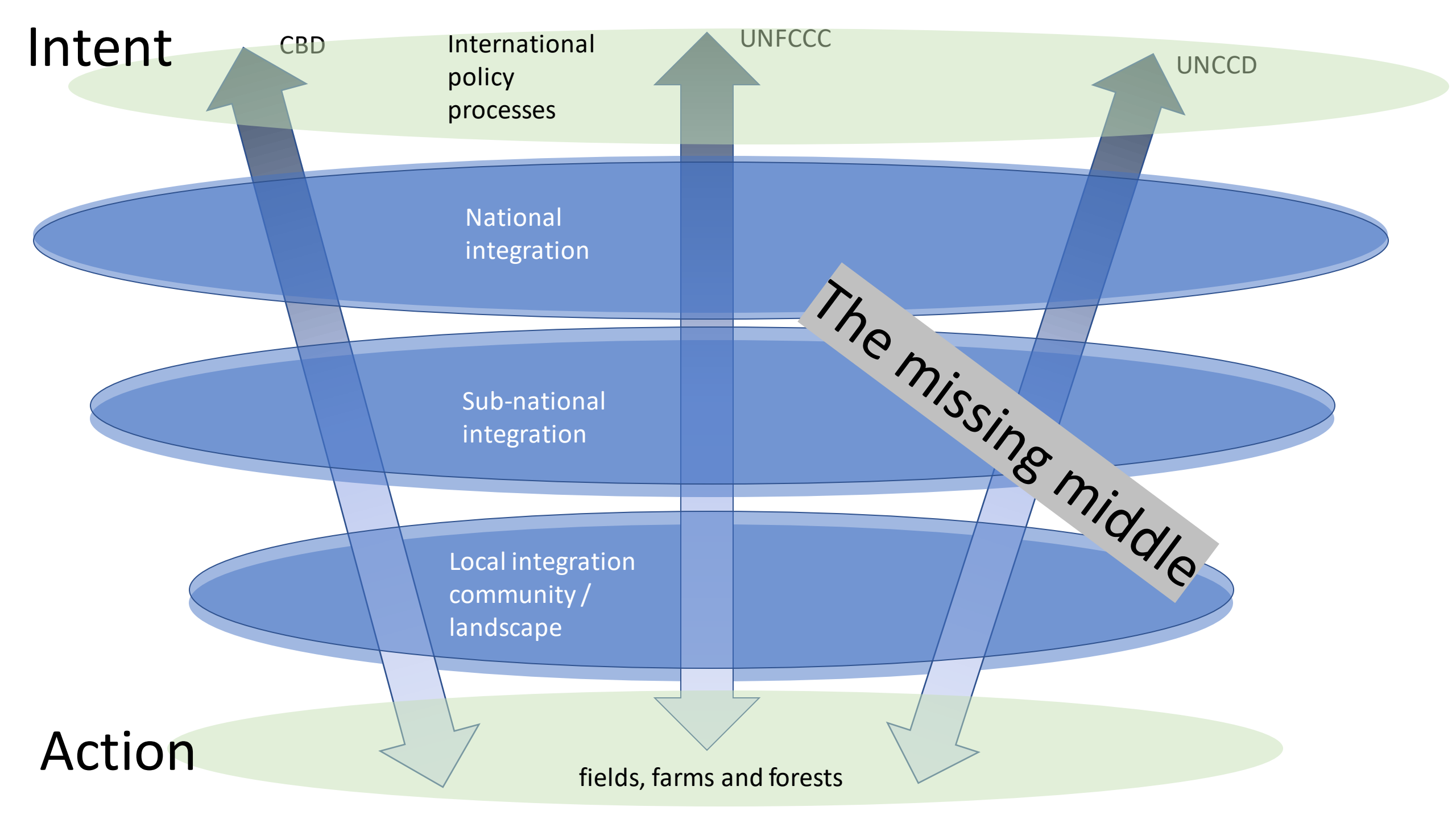

Intent
CBD
International policy processes
UNFCCC
UNCCD
National integration
Sub-national integration
Local integration community / landscape
The missing middle
Action
fields, farms and forests

FIGURE 7 Key Actions Required to Enable Adoption of Agroecological Practices at Scale to Build Resilience of Farming and Food Systems