Agroecological Transformations: Challenges and Possibilities

Sept. 12, 2025, Institute for Agroecology, Univ. of Vermont

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Agroecological Principles and Farming System Transformation

Transformational

Level 5: Build a new global food system, based on participation, localness, fairness, and justice

Level 4: Reconnecting the two most important parts of the food system - consumers and producers, through the development of alternative food networks

Incremental

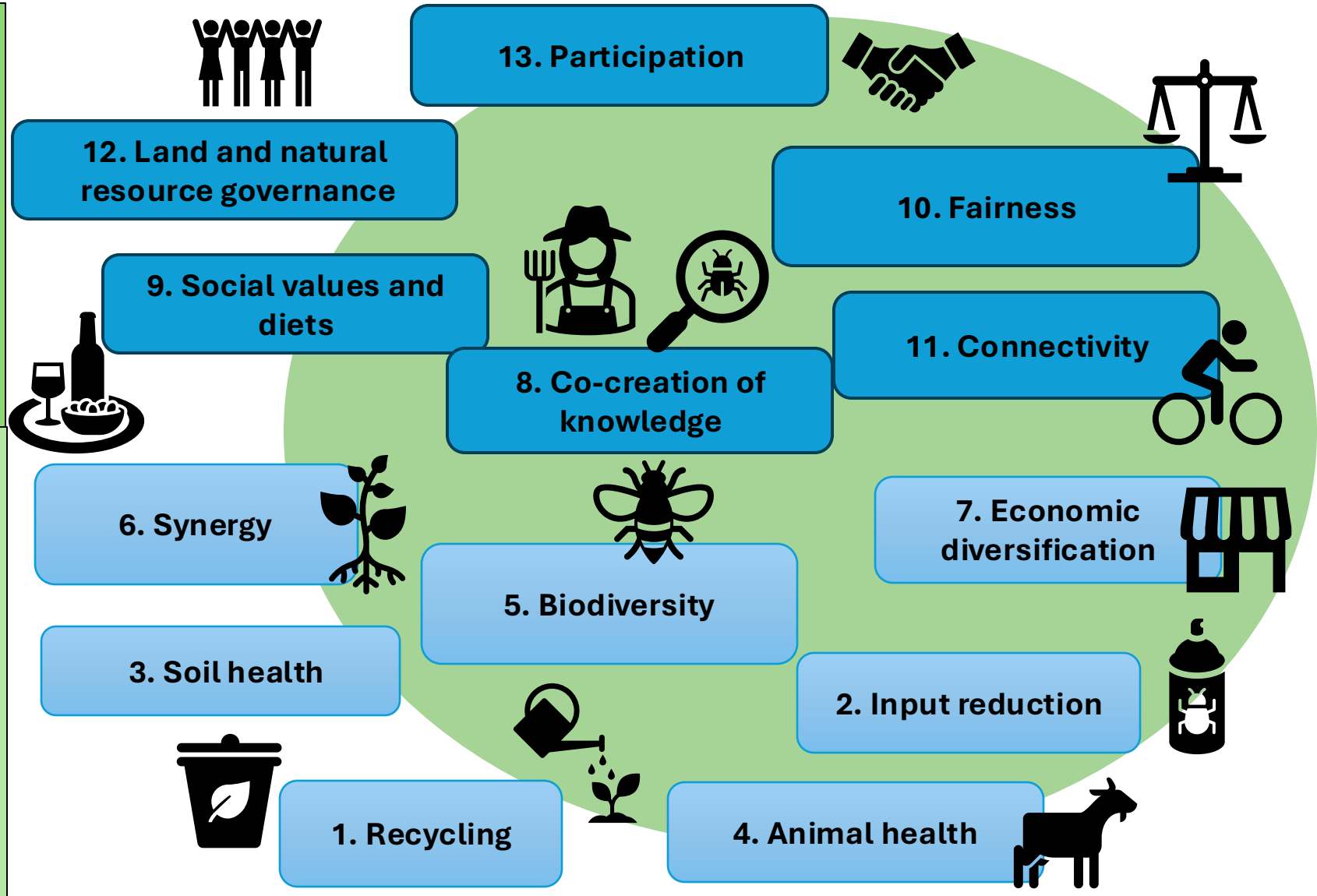
Level 3: Redesign the agroecosystem so that it functions on the basis of a new set of ecological processes that provide system resistance

Level 2: Substitution of conventional inputs and practices with alternatives

Level 1: Increase input use efficiency, reducing the use of costly, scarce, or environmentally damaging inputs

Food system

Agroecosystem



Adapted from Figure 4 in Wezel et al. 2020.

How does transformation happen?

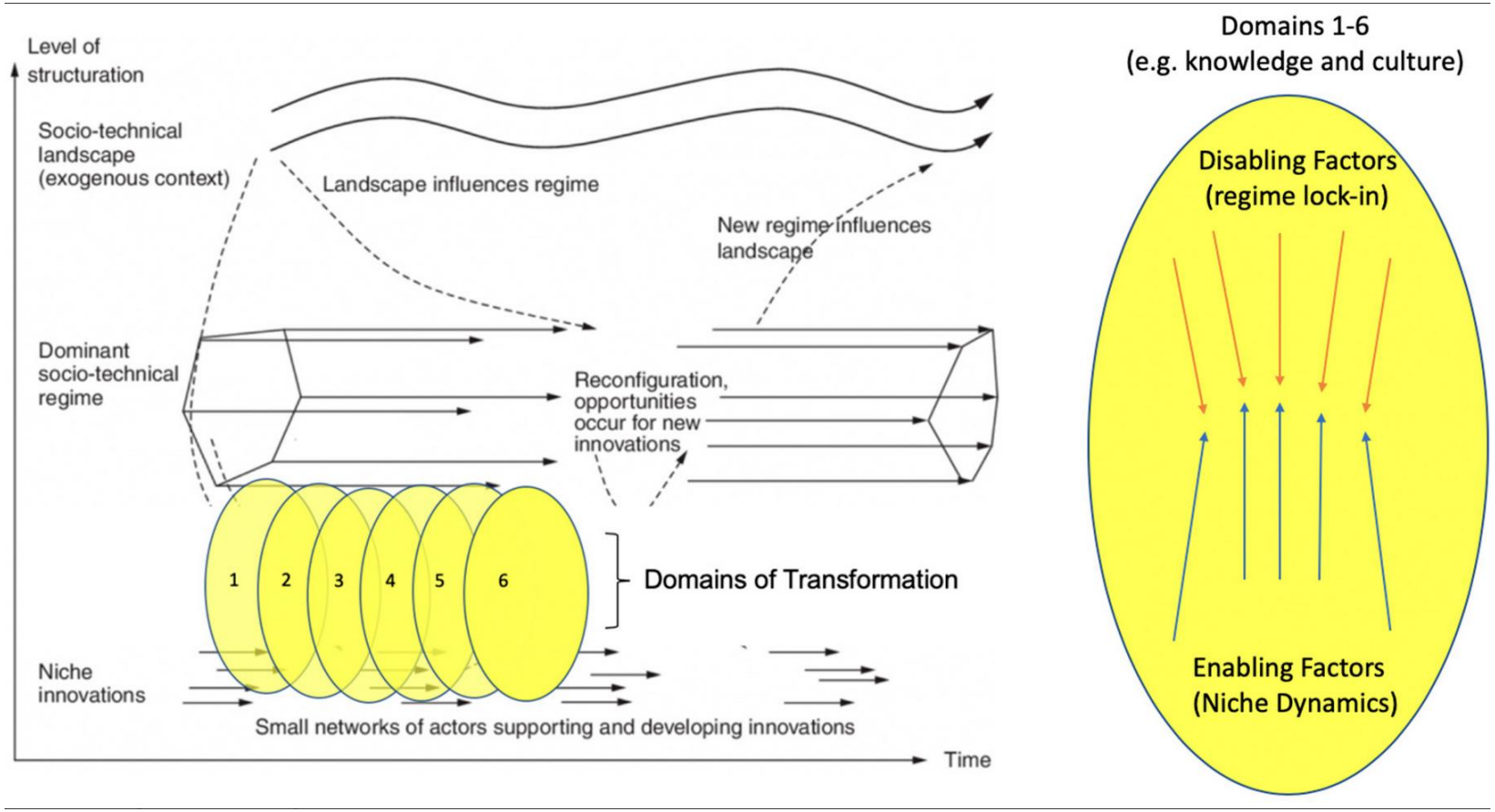
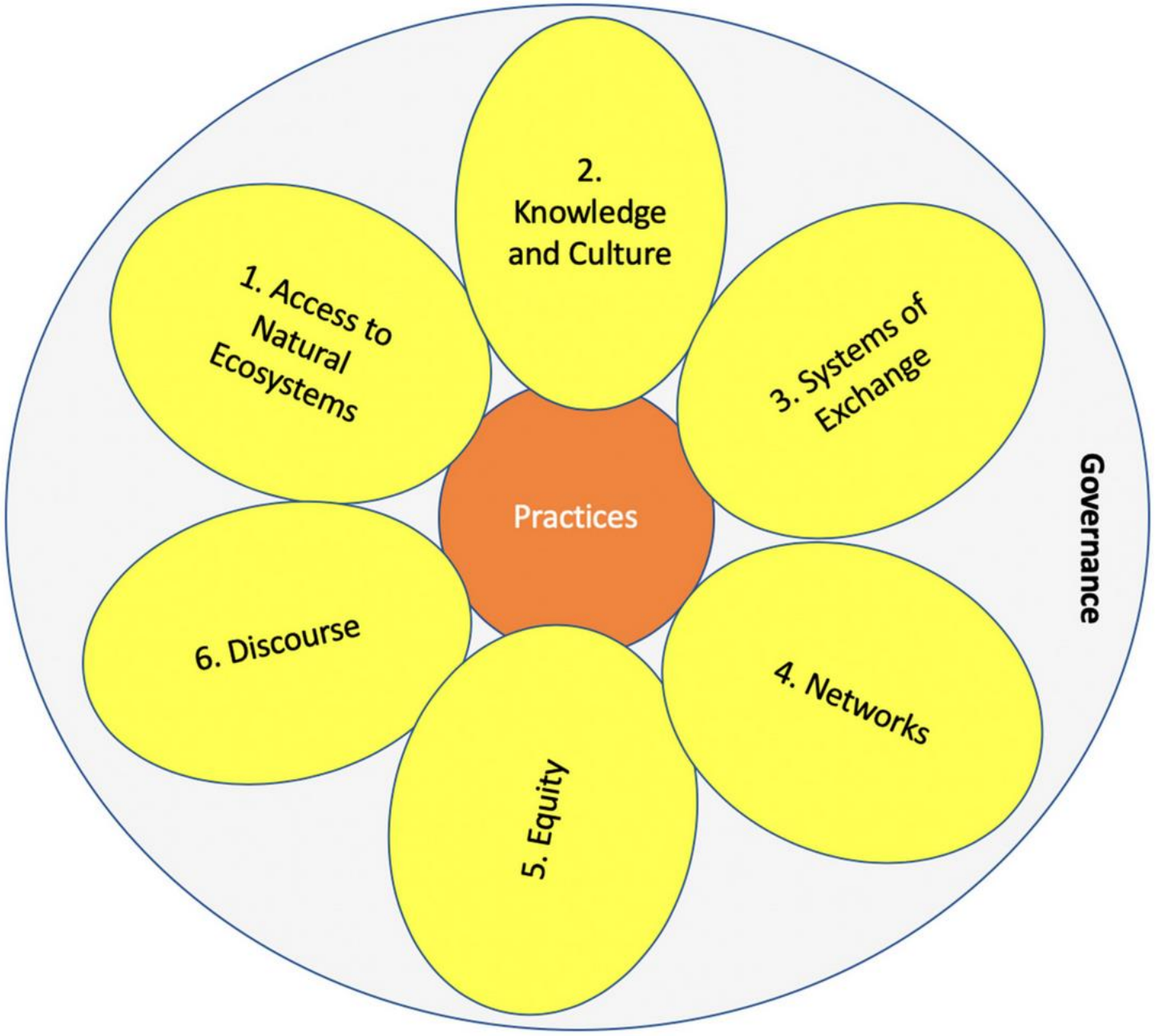


Figure from Anderson et al. 2019, adapted from Geels, F.W.; Schot, J. Typology of sociotechnical transition pathways. Res. Policy **2007**, 36, 399–417.



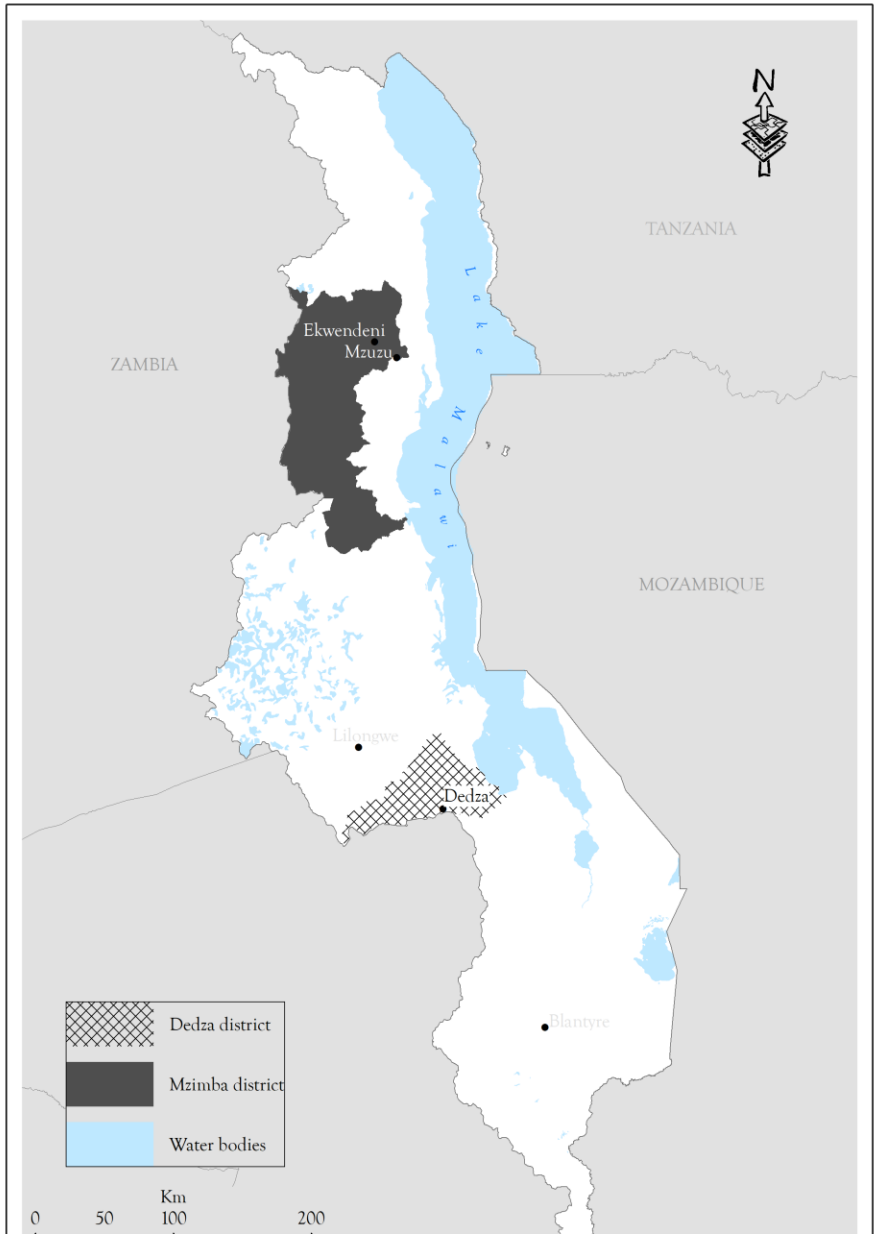
Domains of agroecological transformation

- Knowledge & culture
- Agroecological practices
- Networks
- Address (in) equities
- Systems of exchange
- Governance and Discourse

Figure from Anderson et al. 2019.

Background: Malawi

- Maize-based with legumes, tubers, tobacco
- Mixed farming, ~50% have poultry, pigs or goats
- Low soil fertility, semi-humid agroecosystem
- Unimodal rainfall, ~1000-1500 mm/year
- Majority smallholder farms (3.85 million ha), average farm size in crop production 0.74 ha
- Chronic food insecurity, 50% live in poverty
- Average household size ~4.8 people
- Gender inequality and high child malnutrition
- Reliance on synthetic fertilizer; govt promoted fertilizer and monoculture maize with input subsidies but have increased in price at various time periods.



Source: Benson, T. and J. De Weerdt. 2023. Employment options and challenges for rural households in Malawi An agriculture and rural employment analysis of the fifth Malawi Integrated Household Survey, 2019/20 https://massp.ifpri.info/files/2023/04/Working-Paper-40-Apr2023-revised.pdf

(some of the) Challenges: Malawi Context

- Debt load, limited government funding makes government highly dependent on international funding;
- International funding and national subsidies often focus on agricultural intensification of staples;
- Climate change impacts can be severe, affect transport infrastructure and food production e.g. floods, drought.
- Increased concentration of agri-food system on retail side;
- Food prices, cost of living can make local markets unstable.

Storm Freddy: Malawi declares state of disaster as more than 200 killed

14 March 2023 Share Save

Peter Jegwa in Lilongwe & Will Ross in London
BBC News

The destruction of roads and bridges has hampered relief efforts

Photo source: https://www.bbc.com/news/world-africa-64938811 and author.

Participatory Research with Farm Households

Overall Research Question: Can agroecological methods be used to improve food security, nutrition, livelihoods & well-being of smallholder households?

Study 2: (2013-17) 6000 households in Malawi, pre-post / control

Study 1: 400 households in Malawi, food insecure, 20 villages, Pre-post design (2012-14)

Study 3: (2017-2020) 500 households, pre/post control/intervention

Research methods

- Long term research with multiple studies
- Quasi-experimental design: Pre-post and control – intervention comparison
- Surveys, interviews
- Agricultural, nutritional, social and ecological data
- Participatory workshops
- Photovoice project with 40 farmers in 6 village areas using agroecological practices;
- Focus group discussions after photos.

Agroecological Experiments: Farm Management

5. Biodiversity

1. Recycling

3. Soil health

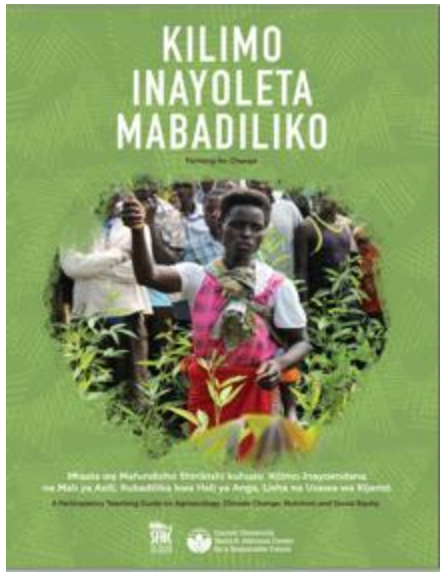
6. Synergy

Knowledge co-creation

- Food insecure farm households invited to participate
- Farmer-to-farmer learning, exchange & farmer experimentation.
- Monthly meetings, annual workshops to revise plans.
- Farmers choose agroecological practices to test:
  - Agroforestry (fruit & leguminous trees)
  - Double intercropped legumes (pigeonpea, groundnuts)
  - Compost and intensive animal manure application
  - Crop diversification e.g. sorghum, finger millet, cowpea.

8. Co-creation of knowledge

Cultural change & addressing inequities: Community-based educational activities



11. Connectivity

10. Fairness

- Developed integrated curriculum (agroecology, climate change, nutrition, social equity) aimed at farmers in southern Africa;
- Theatre, hands-on activities, story-telling, small group discussions.
- Developed by farmers, scientists, NGO staff.

Bezner Kerr, R., et al. 2019. Farming for change: Developing a participatory curriculum on agroecology, nutrition, climate ch ange and social equity in Malawi and Tanzania, *Agriculture and Human Values* 36 (3): 549-66. Bezner Kerr, R. et al.. 2016. "Doing Jenda Deliberately" in a Participatory Agriculture and Nutrition project in Malawi. 2016. In: *Transforming Gender and Food Security in the Global South*. London: Routledge; Satzinger, F, et al. 2009. Farmers integrate nutrition, social issues and agriculture through knowledge exchange in northern Malawi. *Ecology of Food and Nutrition* 48 (5): 369-82.

Agroecological practices significantly improved crop diversity, food security & dietary diversity

Increased **food security** and **dietary diversity** in all studies. **Crop diversity, compost application** & participation in agroecology positively associated with food security.

Women's dietary diversity higher for those in participatory agroecology intervention

A household was 32% less likely to be severely food insecure per additional food crop grown.

Modest but significant increases in household income for those using agroecological practices.

Adding compost to the fields. Photo credit: G. Chisi, 2022.

Kangmennaang, J. et al. 2017. Impact of a participatory agroecological development project on household wealth and food security in Malawi. *Food Security* 9: 561-576 Madsen, S., et al. . 2021. Explaining the impact of agroecology on farm-level transitions to food security in Malawi. *Food Security* Santoso, M.V., R. Bezner Kerr, et al. 2021. A nutrition-sensitive agroecology intervention in rural Tanzania increases children's dietary diversity and household food security but does not change child anthropometry: results from a cluster-randomized trial. *Journal of Nutrition*. Owoputi et al. 2022. Does Crop Diversity Influence Household Food Security and Women's Individual Dietary Diversity? A Cross-Sectional Study of Malawian Farmers in a Participatory Agroecology and Nutrition Project. *Food and Nutrition Bulletin*. 43(4):395-411.

Farmer narratives: Pride in achieving food security & repairing soils

‘I am standing in a tall maize field. This is local maize in my dimba. I added compost (bokashi type). The soil is already good. .. I am clapping to show that I am very happy, the maize is doing very well. There are also wild fruits (chikuyu tree).’ (I. Mvula, Jombo, March 2022).

New ways of being

'I am doing laundry. I have just come from the garden, my wife was busy so I decided to do laundry…I carried firewood home after cutting the pigeonpea. It is also a part of *jenda*' (*I. Soko, Kalihoro, February 2022)*

‘We are planting rice. This is our second year. I got seed from my neighbour. Last year it grew very well. It was so nice that we ate everything! This year I will keep the seed. I also got seed from the neighbour this year. It is dambo rice. The neighbour said that you can also try, and I did and it was so nice, so now I won’t stop.’ *M. Nkhosi and K. Nyirongo, Jombo, March 2022.*

Farmer Networks of Experimentation & Sharing

Companionship with animals

These are my chickens. I took this photo because they are helping me by going through the field and eating the pests. You can't see the *luwenya* (pests) in the beans, the chickens are helping. *D. Simon, Edundu, February 2022.*

Headaches, frustrations and worries

‘Damaged maize with *kapuchi (*Fall Army Worm). We work very hard in our fields, but when we encounter this problem – it is very hard. Because of the [agroecology] training we had, it is less of a problem.’ *A. Mwanza, Jombo, March 2022.*

‘My banana trees were damaged by floods. It is the first time I’ve ever experienced this amount of flooding. I am out of options because all 4 fields have been damaged. I don’t know where to start from. I am feeling hopeless.’ *S.Mowe, Jombo, March 2022.*

Restorative spaces

This is the forest around my home that has regenerated since 2012. It is ¼ acre. I left it, didn't plant. If you have no trees, you can't feel well, so you need the trees. The trees help me have fresh air and to fetch firewood. *S. Chavula , Kawanda, March 2022.*

Multiple Pathways to Food Systems Change

Agroecological practices reduced farm costs:

- Saved money on foods previously purchased & fertilizer, **invested in animals as a source of savings;**
- No longer had to work off-farm, instead could invest in own farm and in **dry season vegetable gardens;**

Addressing gender inequity also mattered:

- In one study, farmers who **discussed farming with their spouse** were 2.4X more likely to be food secure & have diverse diets.

Madsen, S., et al. . 2021. Explaining the impact of agroecology on farm-level transitions to food security in Malawi. *Food Security.* Bezner Kerr, R., et al. 2019. Participatory agroecological research on climate change adaptation improves smallholder farmer household food security and dietary diversity in Malawi. *Agriculture, Ecosystems and Environment* 279: 109-121. Kangmennaang, J., et al. 2017. Impact of a participatory agroecological development project on household wealth and food security in Malawi. *Food Security* 9: 561-576.

Farmer networks and farmer-led research crucial design feature

Farmers participating in **farmer-to-farmer learning activities** increased their knowledge, and significantly more likely to practice and sustain agroforestry, composting, mulching & legume intercrops.

Attention to **social inequalities**, such as gender division of labour and decision-making, and community-based educational activities important for ensuring positive impacts on nutrition, food security.

Snapp, S. S. et al. 2023. Participatory action research generates knowledge for sustainable development goals. *Frontiers in Ecology and Environment* 21(7): 341–349, doi:10.1002/fee.2591 (including figure). Kansanga, M., et al. 2020. Determinants of smallholder farmers' adoption of short-term and long-term sustainable land management practices. *Renewable Agriculture and Food Systems*

Longer term and Landscape-level Changes

- Two years after project ended, 90% of surveyed participants (n=600) using agroecological practices;
- Follow—up study in 2 villages found agroecology-practising farmers **had significantly more land** under fallow and less land under cultivation;
- Agroecology-practising farmers **valued biodiversity and ecosystem services of forests** more.
- Soil agroecological practices had positive landscape-level impacts on some types of biodiversity e.g. butterfly species richness, wasp abundance.

Kansanga, M., et al. 2020. Determinants of smallholder farmers' adoption of short-term and long-term sustainable land management practices. Renewable Agriculture and Food Systems. Kpienbaareh, D., et al.. 2022. Assessing Local Perceptions of Deforestation, Forest Restoration, and the Role of Agroecology for Agroecosystem Restoration in northern Malawi. *Land Degradation and Development*. Vogel, C. et al. 2023. The effects of crop type, landscape composition and agroecological practices on biodiversity and ecosystem services in tropical smallholder farms. *Journal of Applied Ecology* 60 (5):859-874. Vogel, Cassandra, et al. 2022. Local and landscape scale woodland cover and diversification of agroecological practices shape butterfly communities in tropical smallholder landscapes. *Journal of Applied Ecology*.

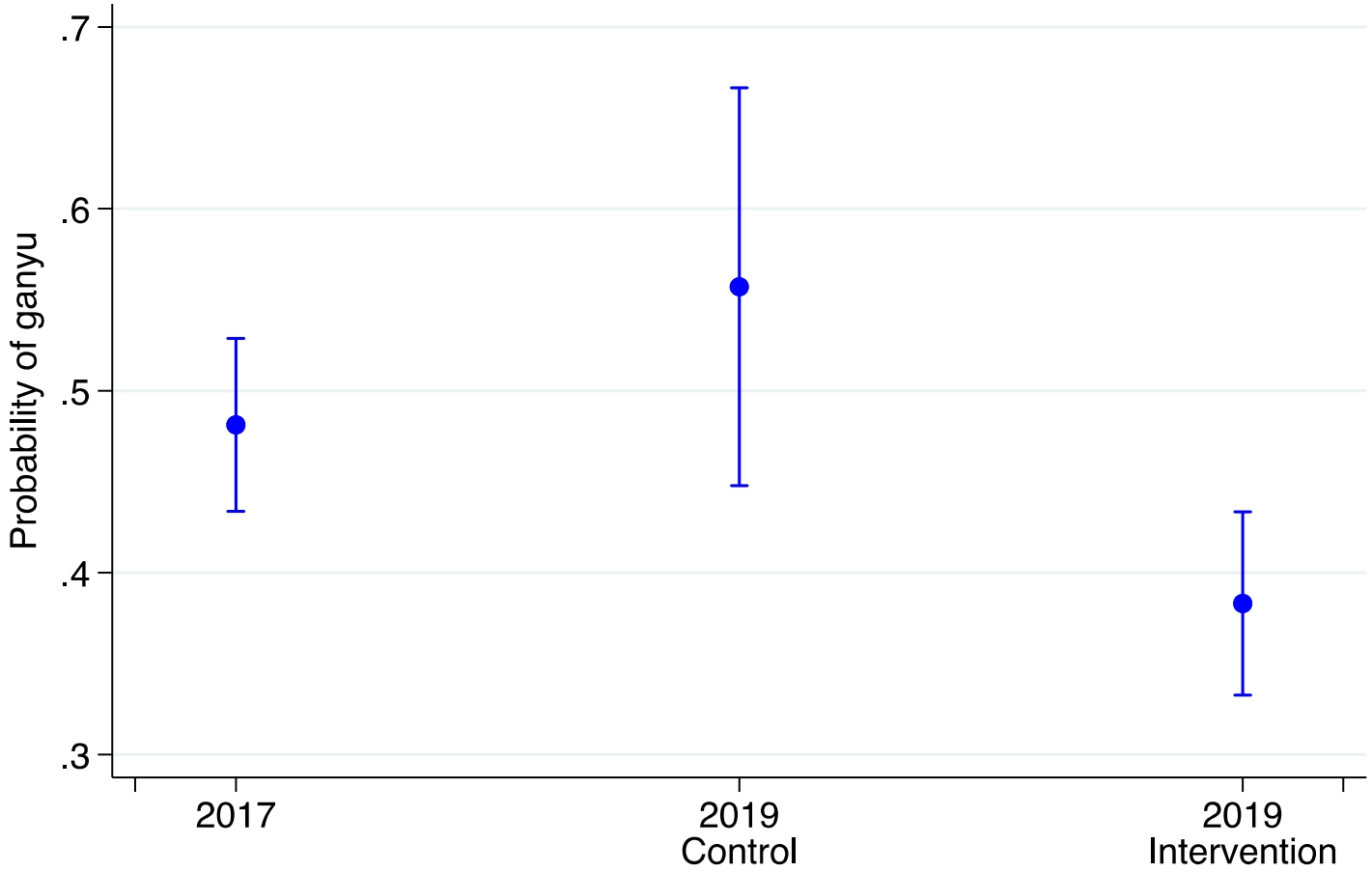
Reducing dependence on exploitative forms of work

10. Fairness

"Now I farm with ease" (2021 int)

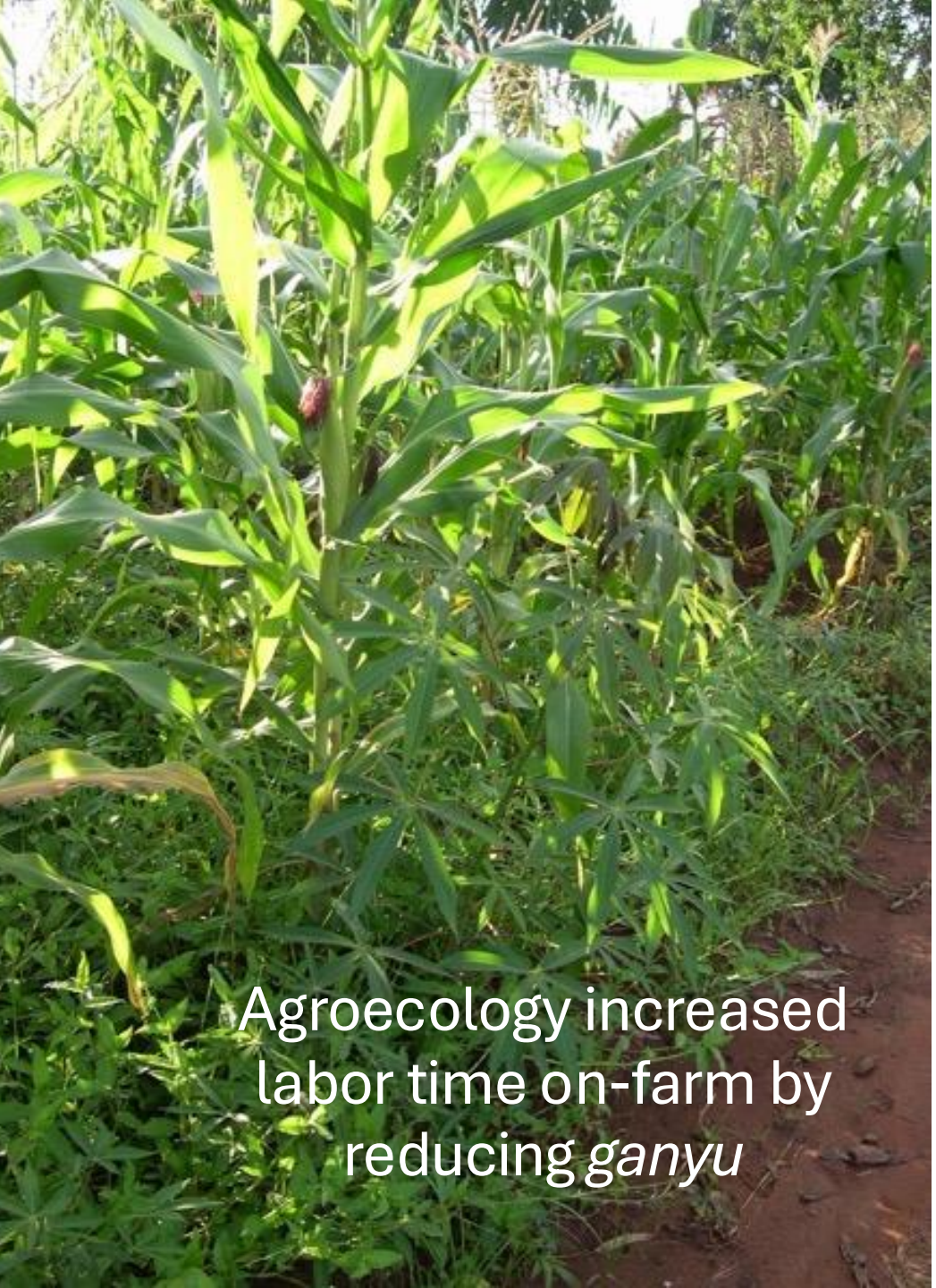
- Shorter workdays
- Complete tasks to satisfaction

"In the past, we would finish our food in August, and then we would have to do *ganyu* while preparing the fields. We would take turns, some days doing *ganyu*, other days doing land preparation. So now that we are applying compost to our fields, it is not extra work." *Semi-structured interview, female farmer, 26 years, January 18, 2016. Mphati village area.*



Madsen, S. et al. A waste of time? Increasing on-farm labor through an agroecological transition in Malawi. *World Development* (under review).

Figure 1. Probability that a household member did *ganyu* during the last year as a main livelihood activity (n=428, 2021 survey)



Agroecology increased labor time on-farm by reducing *ganyu*

Agroecological intensification

De-commodify food & inputs

Reduced *Ganyu*

Increased labor time on-farm

Cultivated land area

Pest & disease management

Soil health

Higher agricultural yields & income

Source: Madsen, S. et al. under review.

Environmental skills regained

- Balance of manual vs. mental work
- In past only basic tasks: tilling, planting, weeding
- Tasks performed quickly, rushed
- With more time: crop inspection & monitoring

"Initially the land wasn't fertile as it is now, for now it motivates us to work more since it's fertile… you can go more often to the farm since you know that the soil is fertile unlike in the past" (Chimbongondo 10).

"The crops make me happy. They make you go even if you didn't want to, you even go both in the forenoon and afternoon just to see if there has been any change.

Int. 1: So before you were not doing this?

"We would just farm and off we go to ganyu. We didn't even inspect for pests, so long as we have farmed and we would be going to ganyu."
-(Edundu 6)

Source: Madsen, S. et al. under review.

Building resilience to climate change

- Increased farmer knowledge about ways to improve soil quality, address pests and diseases, prepare diverse foods;
- Improved soil health and more diverse crops are more resilient in face of droughts;
- Communities more organized, greater sharing of knowledge and resources.

*"This year, with little rain, my neighbors are suffering, but you can see that my situation is okay. My soils can hold moisture, I have some crops." (*25 year old woman farmer, May 2016.)

"I am making compost for the garden. I took it from the pit in the shed behind. This is the first stage. I am making compost because of climate change." (I. Ziwa with 2 grandchildren, Chisangano, February 2022).

Agroecological markets…

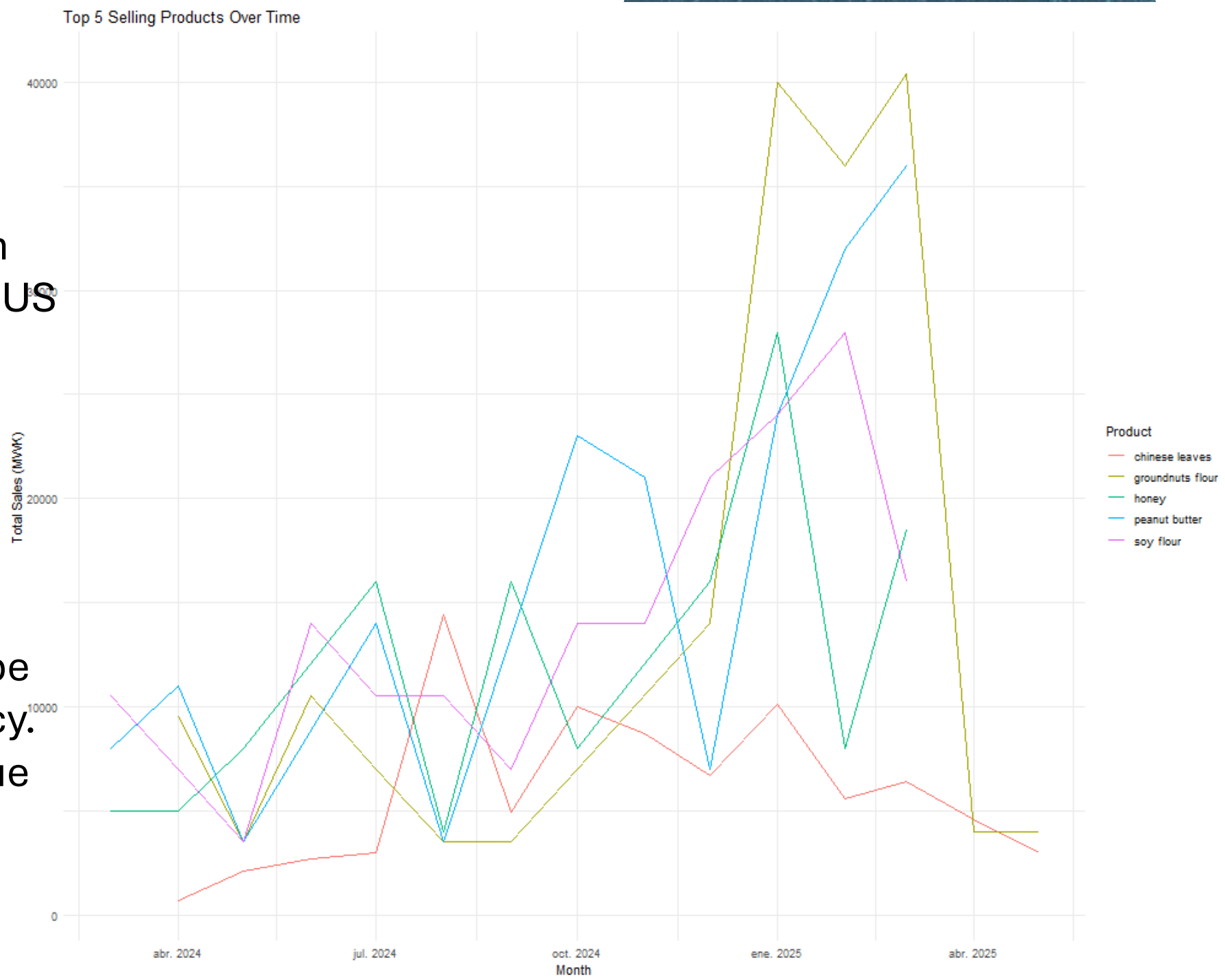
- Local, agroecological markets important to build connectivity with local consumers and improve prices;
- 2023 Roundtables with key stakeholders: municipal leadership, consumer groups, farmers, vendors;
- Shared visions for agroecological markets, developed plans; established agroecological markets in 4 towns/cities in 2024;
- Value-added products e.g. flour, honey.
- Farmer cooperatives and youth groups working together to sell to agroecological markets.

Consumer surveys

- Annual consumer surveys in all 4 markets and daily market sales recorded;
- Awareness of agroecology between 35 – 60% over 3 years, depending on year and market;
- Willing to pay $US 1.38 - $1.74 more for an agroecological food, depending on product (e.g. groundnut flour and peanut butter, but not soy flour)

Market sales

- Monthly sales between 10.000-20.000 MKW ($US 5.50 - 11.50) for top 5 products;
- Top food sales: green leafy vegs, groundnut flour, honey, peanut butter and soy flour.
- Low volume, but may be low recording frequency.
- Potential of added value products.



Challenges & Potential Solutions for Agroecological Markets

Challenges:	Solutions:
• low integration farmers → traders → market; • Personal, private, infrequent, informal relations; • High transport costs and risks. • Small scale flow of food into market; • Lack of consistent demand; • Capital costs for processing equipment.	• Farmer associations send products jointly to reduce transport costs; • Direct sales to lodges, restaurants with value-added products; • Better market record keeping; • Increased consumer communication about agroecology.

Narratives and Policy Analysis

- 26 in-depth interviews with farmers, government actors, academics and civil society organizations;
- Policy analysis of 19 policies for agroecological principles.

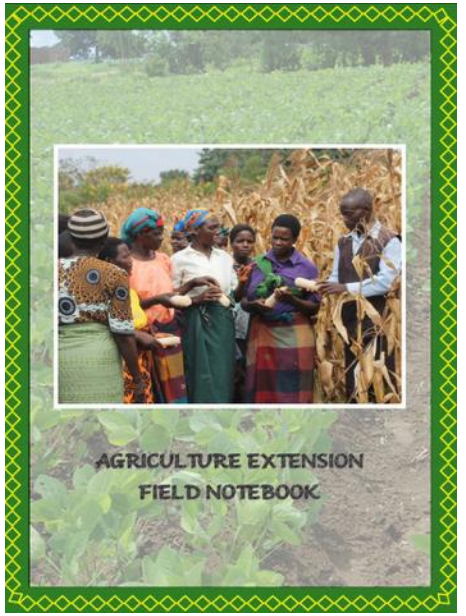
From: Bezner Kerr, R., F. Sanga, S. Schudel and M. C. Munthali. 2024. *The Potential for Agroecology in Malawi: A Policy Analysis*. 9 p. and draft paper forthcoming.

Policy or plan	Year
National Agricultural Policy	2016
National Seed Act	2022
National Fisheries & Aquaculture Policy	2016
National Multi Sector Nutrition Policy	2018
National Agriculture Investment Plan	2018
Malawi Vision 2063	2020
National Resilience Strategy	2018
National Biodiversity Strategy	2015
National Climate Change Mgt Policy	2016
National Forest Landscape Restoration Strategy	2017
National Forest Policy	2016
National Irrigation Policy	2016
Pesticide Act	2015
National Commitment to Achieve Land Degradation Neutrality	2018
National Livestock Development Policy	2021
National Fertilizer Policy	2023
Fertilizer Bill/Act	2022

Barrier: Input subsidy program

- Subsidies in place in 1970s, stopped in 1990s with structural adjustment, reinstated in late 1990s.
- 15 respondents out of 24 considered the input subsidy program as a key barrier to agroecology, including 5 government representatives;
- Cost of subsidy program (30-45% of public agriculture program) at expense of institutions, research and extension needed to support agroecology;
- Discourse of subsidy program emphasized short term yield and income gains rather than longer-term approaches.

Barrier: Agricultural extension format



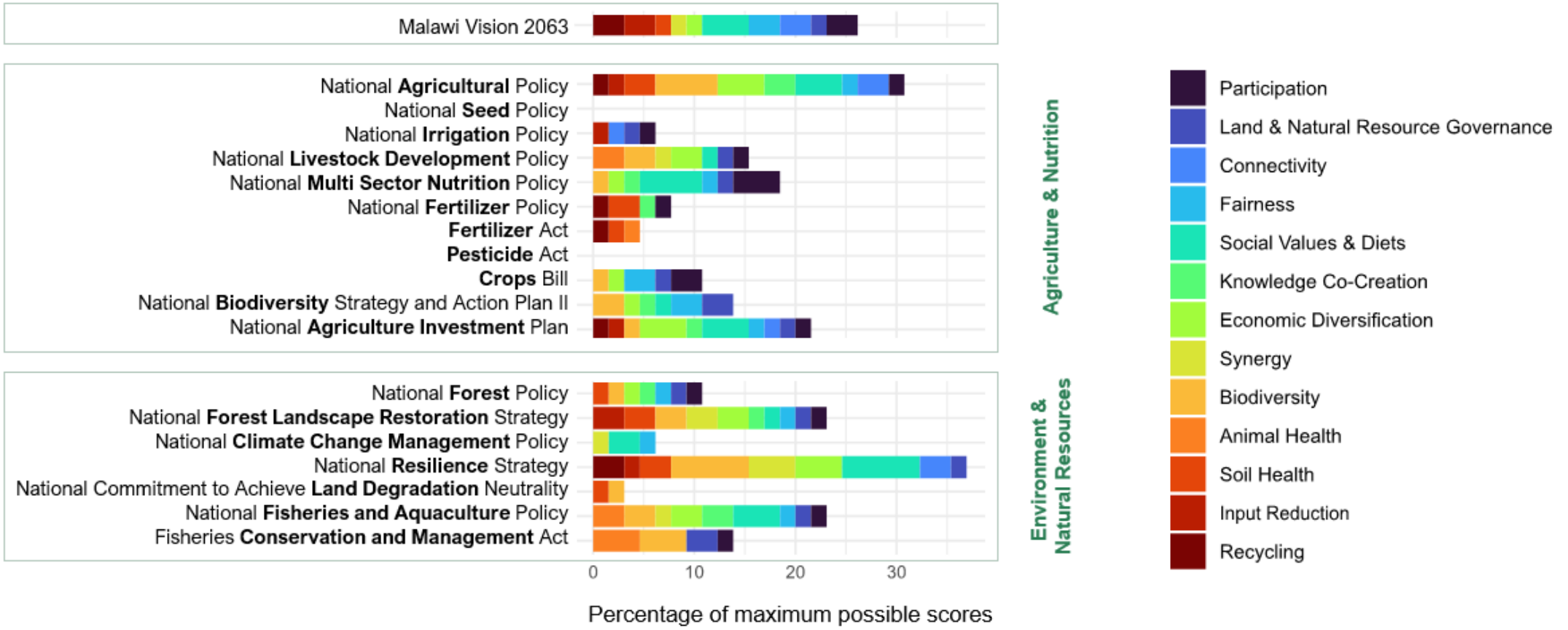
- Half of respondents indicated that government agricultural extension was a barrier to agroecology, including from farmer groups, government, academia and civil society.
- Long history of denigration of local knowledge, expert-driven;
- Lack of capacity and resources in extension also issue.

"Technology transfer models favour foreign solutions and neglect biodiversity and sustainability. Furthermore, the effective dissemination of agroecology is hindered by the lack of agricultural extension staff as well as experiential learning." (Key informant int. 2022).

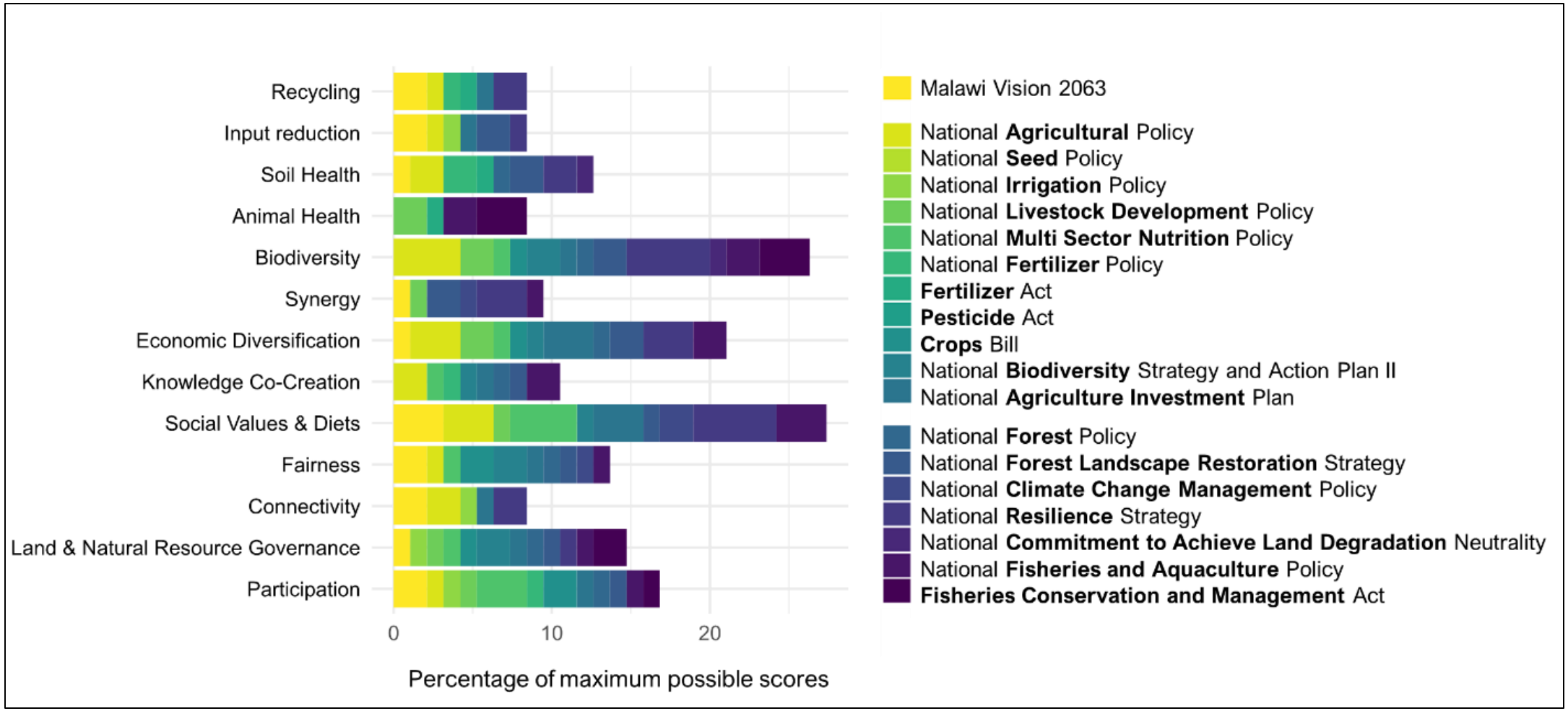
Private & international barriers to agroecology

- Agribusiness companies and international funding agencies create opposition to agroecology;
- Influenced National Seed Policy and promotion of specific seeds/fertilizers.
- Trade policy directly or indirectly impeded agroecology by reducing govt effectiveness to implement policies.
- Agricultural research for agroecology underfunded (influenced by multinational companies and foreign donors).

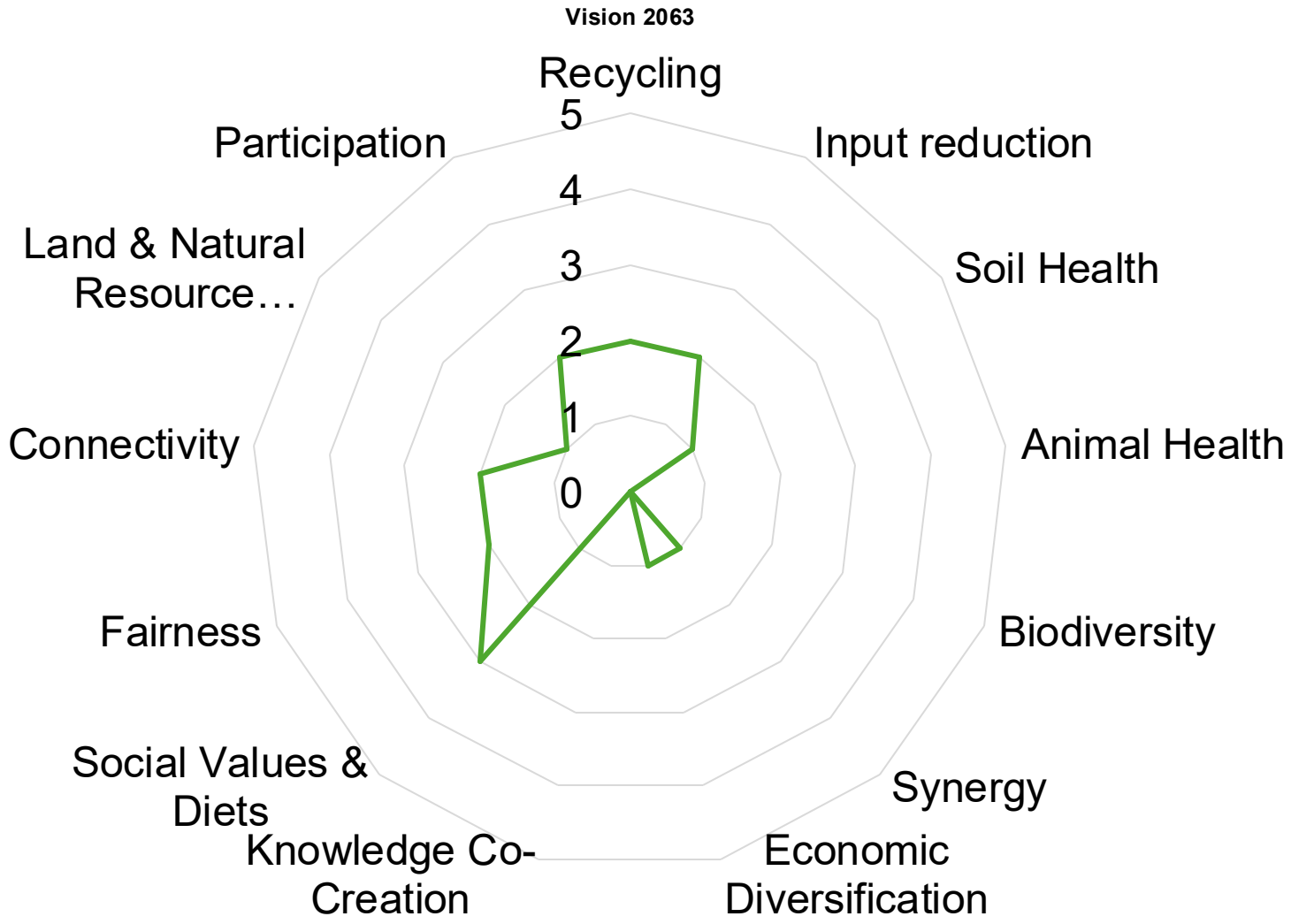
Policy analysis



Agroecological principles supported by policy



Malawi Vision 2063 alignment with AE principles



- 26% of possible score
- Mentioned increased use of organic fertilizer and water harvesting (recycling, input reduction, soil health);
- High value niche crops (biodiversity, economic diversification);
- Green urban spaces, local markets (connectivity);
- Youth-centered wealth creation (social values, fairness)

Chakwera touring Demeter Megafarm in Balaka in July 2023. | STATE HOUSE

Home / News / National News / Mega farms take shape

Front Page | National News

Mega farms take shape

Joseph Mwale · December 9, 2024

Source: https://mwnation.com/mega-farms-take-shape/

New directions (in tension)

- New Mega Farms initiative aimed to promote medium and large scale farmers to grow monocrops e.g. the Malawi Defense Force to grow 218000 MT of maize on 48,400 ha
- Malawi joined Agroecology Coalition
- Promotion of organic fertilizers and new agroecological initiatives in country, including 'Agroecology Hub'
- Discussion of National Agroecology Policy

How to Support Agroecological Transformations?

- Establish participatory, iterative processes that foster knowledge co-creation
- Adapt agroecological practices to local context;
- Address inequities; build on socio-cultural values
- Build networks amongst farmers and beyond
- Support regional market opportunities and connection with urban consumers
- Resist and challenge dominant narratives about agroecology, drawing from local experiences
- Support social movements pushing for broader political change.

Acknowledgements, Thank You & Questions

***Research Collaborators*:**

- Soils, Food & Healthy Communities
- Markets research: Allison Loconto, Miguel González, and Harness Farms team
- Institutional barriers research: Sidney Madsen, Seraina Schudel, Fredrick Sanga, Mwiza Munthali.
- Western University, Canada
- Mzuzu University, Malawi
- Lilongwe University, Malawi
- Chancellor College, Univ of Malawi
- Würzburg University, ,Germany
- Norwegian Institute of Bioeconomy (NIBIO)

Funding sources for Malawi research:

Belmont Forum and Biodiversa
National Science Foundation
Biovision Foundation
Government of France
McKnight Foundation, CCRP
Global Affairs Govt of Canada
Daniel & Nina Carasso Foundation
Atkinson Center, Cornell University
International Development Research Centre, Canada
Agropolis Foundation

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Case Study 2: Brazil

- Highly unequal land ownership
- Green Revolution promoted 1960s
- Soy and livestock for export markets
- Brazil as ‘agricultural powerhouse’
- High use of agrochemicals in farming

Source: Blesh et al. 2022; Image: https://en.mercopress.com/data/cache/noticias/62914/0x0/3000.g5.4.lec.agriculture-intensive-2.jpg

Agroecological practices, southern Brazil

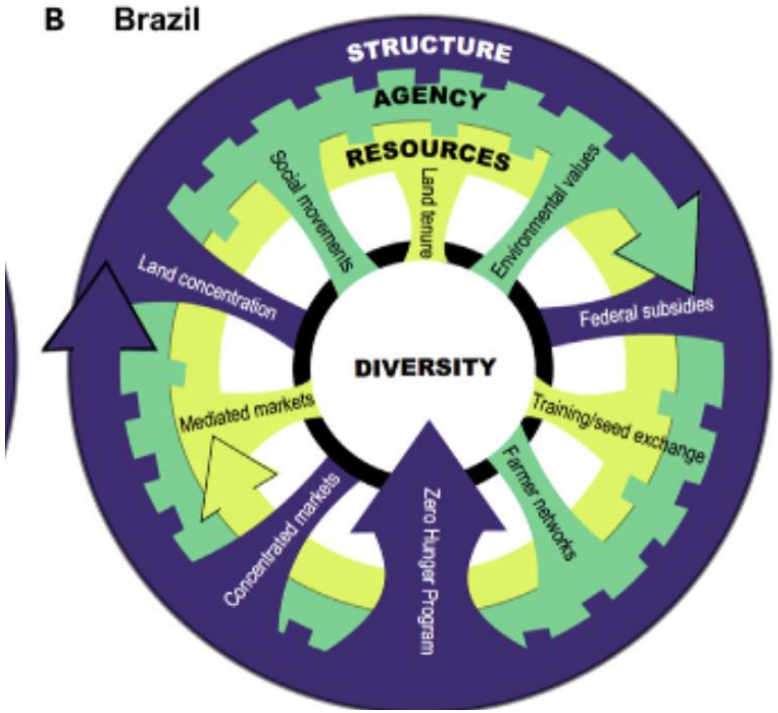
offee grows in an agroforestry system at Egídio Brunetto Rural School.
arcelo Delfino, IPE archive.

- ~35 ha average small farm
- Diversified, mixed cropping system
- Agroforestry e.g. coffee, fruit trees with pasture or crops
- Legume intercrops, cover crops
- Reduced use of pesticides, fertilizers
- Compost

Blesh et al. 2022; Image: https://elti.yale.edu/our-stories/agroecology-alternative-promoting-productive-backyards-brazil

Agroecological transition through political change

- Social movements such as MST promoted agroecology;
- Farmer networks share knowledge about agroecological practices
- Farmer peer certification in regional marketing system supports agroecological markets
- Health and environmental concerns regarding high use of pesticides in rural & urban areas;
- State ‘zero hunger’ program provides public procurement, credit for family farms to support diversification



Organic produce for sale at the Agrarian Reform Fair, organized by the MST to sell produce from family farmers and spread the word about agroecology and land reform. (Photo credit: Tânia Rêgo/Agência Brasil)

Image: https://civileats.com/2020/09/30/brazils-landless-workers-persist-through-agroecology/