Policy Brief /December 2022

Policy and Institutional framework for mainstreaming Agrobiodiversity and Ecosystems Services in Malawi

Summary

- The FARMS4Biodiversity project was implemented in northern Malawi to address (agro)-biodiversity conservation-based ecosystems services (ESSs) and improve food security through farmer-led agroecological (AE) research supported by interdisciplinary team and Multi-Actor Platform (MAP).
- AE practices adopted by farmers such as intercropping/crop rotations with legumes, mulching, and composting have increased bees' and butterfly diversity, pollination services, biological pest control, crop production and improved soil health.
- Farmers' adopting AE practices were better off than non-AE farmers in terms of food and seed security.
- Natural enemies like predatory beetles, spiders, ants are effective in biological pest control thereby reducing reliance on use of pesticides and damage on (agro)-biodiversity species.
- Semi-natural habitats that are adjacent to farmlands increased flowers availability, which are used as food source for pollinating bees and butterflies.
- AE farmers mapped their farm conditions more accurately than non-AE farmers using participatory geographical

- Interdisciplinary approach and engaging MAP members increased the legitimacy of the project results and channelizing scientific inputs to policy and institutional framework.
- Enabling policy and institutional framework (through MAP and stakeholder engagement) will promote implementation of national policies related to (agro)-biodiversity and ESSs in Malawi.

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Background and Context

Malawi suffers from food insecurity, malnutrition, deforestation, soil degradation and climate change, and these have threatened biodiversity and ecosystem services despite various interventions and initiatives taken so far. The reasons include lack of appropriate technology, investments, enabling institutions and policy frameworks.

From a policy perspective, a number of policy initiatives and instruments that could serve as entry points for effective conservation, sustainable use of biodiversity-based ESSs in Malawi, are already in place (Table 1). For example, the national biodiversity strategy[1] of Malawi calls for reduced usage of pesticides to prevent damage on terrestrial and aquatic biodiversity. In this regard, there is a lack of institutional framework to mainstream agrobiodiversity-based ESSs.

From a technology perspective, a growing body of research results suggest that AE practices (such as the use of *pesticidal plants as botanical sprays, crop diversification through intercropping/crop rotation supplemented with composting/mulching*) may buffer a farm/landscape against loss of biodiversity and ecosystem services. However, there is a lack of information and knowledge on **how AE practices and land use change influence biodiversity and ecosystem services on farmlands (here after called agrobiodiversity and associated ESSs).**

Results and Outcomes

Some of the project results and outcomes are briefly described below:

➔ ***Bee and butterfly diversities and abundance increased through AE farming interventions***

The key findings on pollinating bees and butterflies' diversity and abundance in AE farming has been reported by *Vogel et al. (2021)* as follows:

- About **84 individual bees** belonging to **13 different species and 127 individual blister beetles** were identified and characterized. The bee community was dominated by honeybees (Apidae: *Apis mellifera, L.*).
- **Bee abundance** (not blister beetle pest abundance) was higher in landscapes dominated by agriculture than in seminatural habitats (forests or shrubs).
- Pigeon pea, a legume grown by farmers, is an important food **source for bees and other pollinators. It is** also important for humans due to higher nutrient content (e.g., proteins) and its role in soil improvements through nitrogen fixation and drought tolerance.
- **Higher crop diversity** surrounding the agricultural fields is beneficial to farmers with more honeybees and other insect pollinators, and provides better income to farmers.

FARMS4Biodiversity Project

The project *'Farmer-led Agroecological Research in Malawi using Scenarios for Biodiversity and Ecosystem Services' (FARMS4Biodiversity)* was aimed to address biodiversity conservation, support ESSs and improve food security under scenarios of land-use change in the Global South. It was implemented in Northern Malawi (Figure 1) in Mzimba district across 24 villages covering an area of 500 km^2 during 2018-2022. The Mzimba District is rich in (agro)-biodiversity and ESSs. The area is also one of the hotspots for Fall Army Worm (FAW) that attack maize and other field crops. The project consortium consisted of partners from Germany, Canada, United States of America, Norway and 2 local institutions from Malawi supported by multi-actor platform (MAP). The project used past research work and experiences on agroecology in the area, for e.g., the Malawi Farmer to Farmer Agroecology (MAFFA) project, and other earlier initiatives.

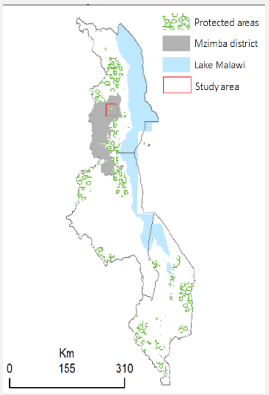

Figure 1: Location map of the study area: Kpienbaareh, D.

Agrobiodiversity – Definition

Agrobiodiversity can be defined as 'the diversity of living organisms (plants, animals, microorganisms, etc.) in farmlands that are used directly or indirectly for food and agriculture, including crops, livestock, forestry and fisheries' (Bioversity International, 2017).

Semi-natural habitats – definition

'Habitat within or outside of the crop containing a community of non-crop plant species that have been substantially modified in their composition, balance or function mainly by human activities such as traditional agricultural practices' (Holland et al., 2017).

Figure 2: Collection of butterflies used for pollination, *Credit : Vogel, C.*

- About **66 butterfly species** and **5372 individuals** were identified, characterized, and documented (Figure 2).
- Butterfly diversity (at species and individual level) was lower on farmlands than semi natural habitats. This is probably due to low diversity of nectar-providing plants, lack of suitable host plants for larvae to feed and distance to natural habitat.
- Seminatural habitat increased the number of flowers on farmlands, which can be used as food source and host plants by butterfly species.
- AE practices such as intercropping maize with different legumes directly increasing crop diversity and indirectly improved pollinators diversity

➔ ***Natural enemies are used as biological -pest control***

- Excessive use of synthetic pesticides can kill natural enemies as well as pests, which can make a pest problem worse in some cases and reduce pollinators and/or below ground biodiversity (Mijatović et al., 2018).
- Natural enemies are insects like predatory beetles, spiders, ants, and wasps. They eat or lay their eggs in pests like caterpillars, termites, aphids, and leaf beetles. Figure 3 shows a group of ants attacking a fall army warm on maize plant (Figure 3).

Figure 3: A group of ants hunting a FAW on maize plant. *Photo credit: Georg Küstner*

➔ ***Seed secured farmers are food secured and vice versa***

- The main seed sources for AE and non-AE farmers are from their own seed saving practices, followed by local markets and agro-input dealers (Figure 4).
- Non-MAFFA farmers have better access to seeds through social networks.
- Seed secured households have a higher likelihood of being food secure.
- Agrarian households with strong social ties were more likely to be food secure.
- Households with access to free seeds were twice likely to be food secure than households purchasing seeds by cash or credit-basis.

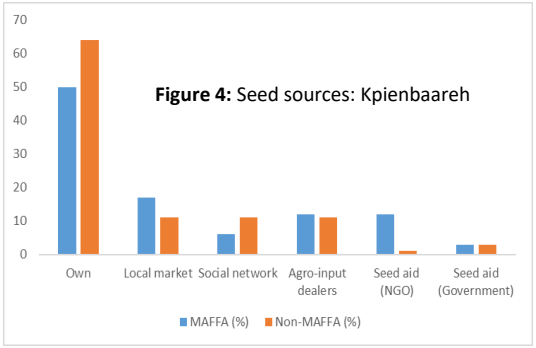

Figure 4: Seed sources: Kpienbaareh

➔ ***Participatory mapping of (agro)-biodiversity and ESSs increased co-exchange of knowledge* among stakeholders *(Kpienbaareh et al. 2022)***

- Farmers who participated in a **participatory farmer-to-farmer agroecology** extension had better awareness of health of crops, soil conditions and functioning of insects on their farms than non-AE farmers.
- **Participatory farmer-to-farmer learning/training** increased knowledge (e.g., information on new farming methods, making home-grown organic fertilizers (Figure 4), biological pest management and fallowing.
- ***Community of practices*** e.g., land fallowing provides the opportunity to recover from degradation and natural *restoration of agroecosystems*. AE farmers were able to maintain longer fallows and were able to meet their food needs while keeping the same farmlands for a longer period.
- AE farmers mapped their farm sizes more accurately than non-AE farmers through **participatory geography information/positioning system** (Figure 6), for e.g., field measurements correlated well with the Global Navigation Satellite System measurement.

Figure 5: community participation in making *bokashi* organic fertilizer, *Photo credit: SFHC*

Figure 6: Participatory mapping of agro-biodiversity and ESSs using global positioning system, *photo credit: Kpienbaareh D.*

Stakeholder engagement through Multi Actor Platform

To promote policy uptake of research results and strengthen science-policy interface, a functional innovative Multi-Actor Platform (MAP) was established at the beginning of the project. The MAP was represented by four organizations (five members in total) including, public, private and community organizations[1]. Small holder farmers, value chain (VC) actors and project partners were put at the centre of the MAP operational structure (Figure 7). The MAP members were interactive in co-creation, co-developing, co-sharing of knowledge/experience on (agro)-biodiversity conservation and associated ESSs.

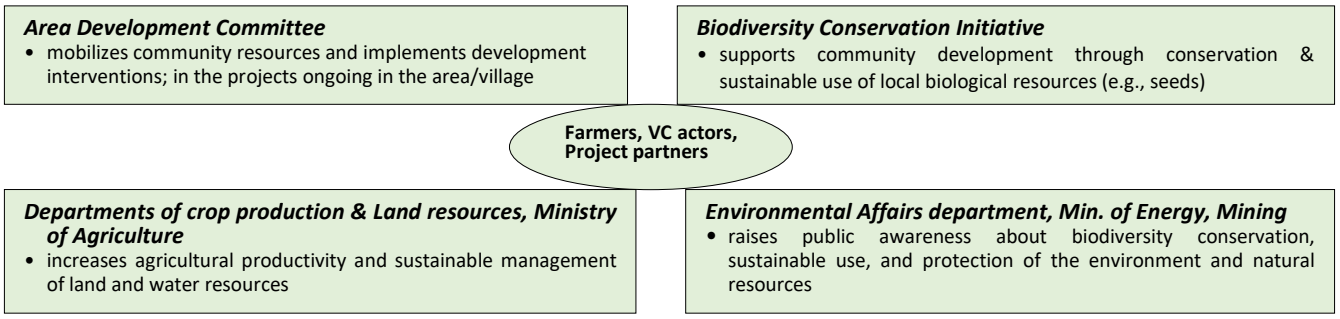

Figure 7: MAP members of Farms4Biodiverity project, their main roles and interlinkages with stakeholders and project partners.

MAP engagement in the project

The MAP members and the stakeholders were engaged in the various project activities at three levels by:

i) Informing/consulting MAP members: Bi-annual dialogue MAP meetings were organized (in total 4 physical/online interactive MAP workshops). The main activities included sharing of information on project results/ outcomes during MAP workshops (e.g., presentations, technical briefs), identifying challenges hindering implementation of project activities and seeking opinions from MAP members during the MAP workshops.

ii) Involving MAP members: In total, 4 exposure field visits were organized for the MAP members to observe project activities, hold discussions with farmers, extension workers and give feedback. MAP members were involved in providing information/data and training the lead farmers/extension workers for e.g., in compost making locally called *Bokashi*. MAPs were also engaged in planning and analysis of scenario development of agrobiodiversity and associated ESSs.

iii) Collaborating with MAP members: The MAP team (in collaboration with extension workers, project partners) facilitated linkage with local, national and regional stakeholders (e.g., research centres, universities, extension offices in local government and farming communities), supported validation, extension and adoption methods (e.g., *agrobiodiversity surveys, participatory mapping of agro-biodiversity and ESSs*). This will continue after the project ends. MAP members were instrumental in the transfer of knowledge, expertise and technologies outside the project areas. Future ccollaborations are foreseen between local agricultural officers, researchers, and academic institutions such as the Mzuzu University.

Sustainability of MAP engagement

There are opportunities to sustain the MAP engagement by:

- **Linking with the existing local and regional forums** to spearhead the promotion of agrobiodiversity and AE research methodologies introduced by the project. This included, promoting the *farmer-to-farmer knowledge exchange approach* through SFHC and Ministry of Agriculture, *creating a platform with Mzuzu University* for research collaboration; co-sharing of knowledge and *strengthening the Malawi agrobiodiversity network*.

- **Integrating the MAP into other government programs** and/or development agencies: For e.g., the recent ongoing project entitled '*Innovative digital plant health services*' which is financed by Norwegian Agency for Development Cooperation (Norad) and other initiatives.

- **Institutionalizing the MAP approach** in the national policies/strategies related to (agro) biodiversity by promoting the proposed integrated policy and institutional framework (in this brief) and other relevant frameworks/plans; and

- **Engaging the MAP members, other relevant stakeholders and project partners** in regional, new EU-Africa Research and Innovation projects in the region and beyond (for e.g., linking with other initiatives like the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).

[1] FARMS4Biodiversity https://soilandfood.org/projects/farms4biodiversity

Project contributions to policy and society

Some of the most relevant national polices/strategies in Malawi related to (agro) biodiversity and ESSs are presented below in the table .

National polices/strategies that can contribute to sustainable conservation of agrobiodiversity-supported ESSs.

Policies/strategies	***goals/objectives (in short)***	***Implementing agencies (lead)***	***Linkages with other Policies & strategies (e.g.)***
Malawi National Biodiversity Strategy & Action Plan II, NBSAP (2015-2025[2])	To increase capacity & knowledge on biodiversity management; mainstreaming biodiversity in policies/plans; reduce direct pressures on biodiversity; improve status of biodiversity; and enhance benefits to all from biodiversity & ESSs	Environmental Affairs Department, Ministry of Natural Resources, Energy and Mining (*MoNREM)*	Malawi Growth and Development Strategy (MGDS), the National Agricultural Policy (NAP)
National Agricultural Investment Plan, NAIP (2018[3]): 2018-2023	To initiate/implement programs aimed at arresting agro-biodiversity deterioration & integrating diverse species in agricultural production, particularly locally sourced germplasm.	*Ministry of Agriculture, Irrigation & Water Development (MoAIW)*	MGDS, NAP, the CAADP Compact and the Malabo Declaration
Seed Bill 2022	To regulate the production, processing, certification and sale of certified seed in Malawi and the importation and exportation of seed	*Malawi Seed Regulatory Authority*	NAIP, MGDS II, NAP, NBSAP
*National Agricultural Policy, NAP (*2016[4])	To achieve sustainable agricultural transformation, increase incomes for farm households, improve food and nutrition security for all Malawians, and increase agricultural exports.	*MoAIW*	NAIP, MGDS II, NBSAP
National Climate Change Management Policy[5] 2016	To create an enabling policy and legal framework for a pragmatic, coordinated and harmonized approach to climate change management	*Environmental Affairs Department, MoNREM*	MGDS II, NAPAs, NAMAs, NAPs

In this brief, the Malawi National Biodiversity Strategy & Action Plan II (NBSAP:2015-2025) was taken as an example to show case some of the project results relevance and contribution to policy and practice. The National Biodiversity strategy and action plan has identified 16 national targets and a number of actions. The strategy strives to:

- attain improved capacity and knowledge on biodiversity management;
- increase mainstreaming of biodiversity in sectoral and local development policies and plans;
- reduce direct pressures on biodiversity;
- improve status of biodiversity through safeguarding of ecosystems, species and genetic diversity; and
- enhance benefits to all forms of biodiversity including agrobiodiversity-based ESSs.

We selected the above mentioned 5 national targets that are most related to agrobiodiversity and most relevant to FARMS4Biodiversity project objectives. A brief description for each target is presented in the next page along with some of the FARMS4Biodiversity project results that can contribute to achieve the national targets (Figure 8).

[2] http://extwprlegs1.fao.org/docs/pdf/mlw149233.pdf
[3] https://www.scotland-malawipartnership.org/files/9815/3113/0121/National_Agicultural_Investment_Plan_2018_Final_Signed.pdf
[4] https://www.canr.msu.edu/fsp/countries/malawi/malawi_national_agriculture_policy_25.11.16.pdf
[5] https://www.preventionweb.net/publication/malawi-national-climate-change-management-policy

Project contributions to Target 1

*The project has provided trainings for about 100 lead farmers (half were women), a number of farmer promoters and others. The trainings included bio-control/**entomology** (e.g., using natural enemies to control pest and diseases), **characterization of pollinators** (e.g., bees, butterflies), **geospatial research methods** (e.g., PGIS for mapping farm conditions and use of GPS devices for collecting spatial data), **local compost making**, **ecological principles** of insect/pest management.*

National Target 1: By 2025, human and institutional capacity for science and technology related to biodiversity is improved.
The aim is to improve human and institutional capacities in science and technology and enhance adoption to promote conservation and sustainable utilisation of biodiversity. The relevant actions include:

- building critical human capacity and national centres for the collection, characterisation and maintenance of agrobiodiversity using clear guidelines and procedures.
- training staff and farmers on collection, characterisation, conservation and storage of (agro)-biodiversity.

Project contributions to Target 3

*A no. of publications including **learning cards, briefs, journal articles** were produced and were disseminated to large number and diverse audiences. **Participatory farmer-to-farmer knowledge exchange** increased spatial perception of farmers (e.g., farm area) and decision making on various farming practices*

***National Target 3**: **By 2025, at least 50%** of the Malawi population is aware of the value of biodiversity to ensure its conservation and sustainable use.* The aim is to raise awareness on biodiversity values and enhance active participation of the stakeholders including policy makers, NGOs, local communities. The actions include:

- conducting awareness campaigns on the role and importance of (agro)-biodiversity in sustainable developments and the role of communities in (agro)-biodiversity conservation.
- disseminating popular publications to raise the profile of biodiversity and increased (agro)-biodiversity knowledge base.

Project contributions to Target 4

*AE practises such as **legume intercropping, and rotation** with maize and other crops has promoted crop pollination services by increasing the abundance and population of pollinators (e.g., bees, butterfly). This has led to increased crop production and soil fertility improvements. Trainings and awareness raising activities were conducted on biodiversity values for e.g., the role/use of pollinators in crop production.*

***National Target 4**: **By 2025, biodiversity values are integrated** into national, sectoral and local development policies and plans.*
Measuring the contribution of biodiversity to overall economic growth is important in order to integrate biodiversity values into the macro and sectoral policies. This target is aimed at facilitating biodiversity accounting for informed decision making for sustainable developments. The actions include:

- mainstreaming issues that have direct impact on (agro)-biodiversity values for e.g., use of pollinators and soil organisms.

Project contributions to Target 6

*About **84 individual bees** belonging to **13 different species, 127 individual blister beetles**, and **66 butterfly species and 5372 individual butterflies** were identified, characterised, mapped and described.*

***National Target 6**: **By 2025, at least 50%** of degraded terrestrial habitats are restored and protected*
The aim is to conserve the terrestrial habitats and contribute to the protection of biodiversity and maintaining the ESSs that are vital to human wellbeing. The relevant actions include:

- Identifying habitats with high species diversity.
- Developing and implementing programmes to protect habitats of high species diversity.

Project contributions to Target 15

***Agro-biodiversity resource** surveys were conducted, participatory scenario analysis and **community action plans** prepared, **land use/land cover maps** of the project area were produced, **integrated policy and institutional frameworks** for mainstreaming agrobiodiversity-based ESSs drafted.*

***National Target 15**: **By 2025, the supply of important ESSs** is safeguarded and restored, considering gender roles and responsibilities of the youth, the poor and the vulnerable.*
Addressing both women and men needs are critical for successful policies and programmes related to (agro)-biodiversity and ESSs. The relevant action include:

- Developing policy and legislative framework on biodiversity management that considers the needs of vulnerable groups (women and youth) and gender roles.

Figure 8: Project contributions to some of the targets in the national Biodiversity strategy and action plan 2015-2025.

Policy and Institutional frameworks for mainstreaming Agrobiodiversity and ESSs

There is a lack of clear operational framework/approach on (agro)-biodiversity conservation (e.g., approaches to agrobiodiversity enhancement), despite significant improvements in the biodiversity and forest conservation, in general (EAD, 2015). The integrated framework on (agro)-biodiversity requires institutional arrangements linked to relevant national policies and strategies. Institutional changes at all levels (local to national) are needed to ensure that all institutions (public and private sector actors) working on (agro)-biodiversity have the resources (e.g., human capital and financial resources) to implement the national policies in an integrated and holistic manner. For this to happen, institutions from local government and private sector actors including civil society, farmer organizations need to be retooled and reframed.

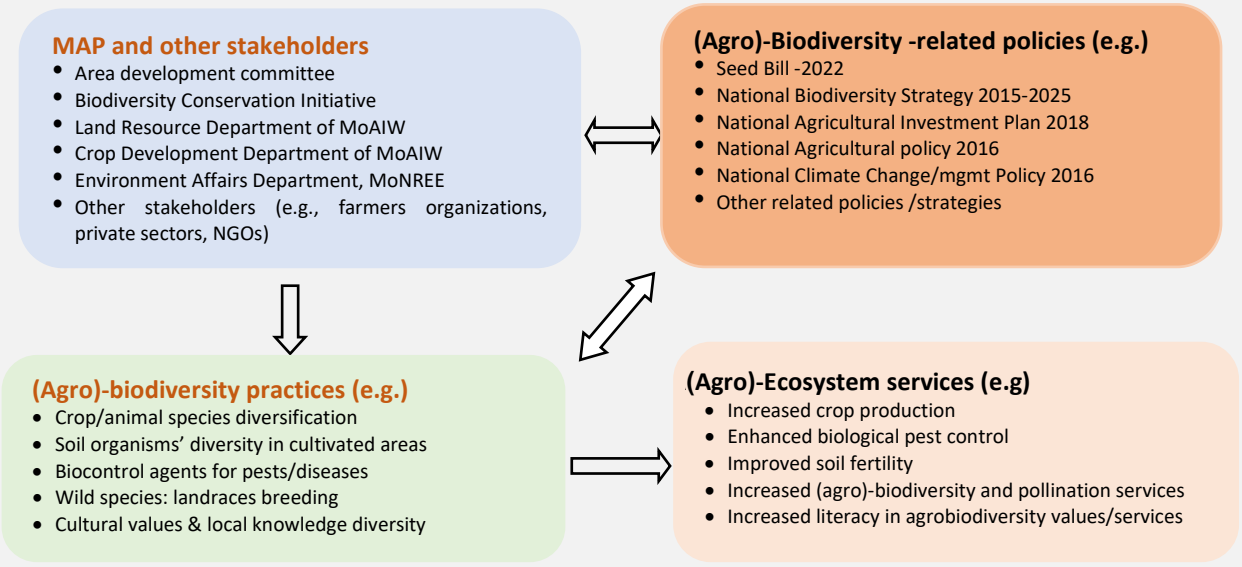

Figure 9: Operational frameworks for mainstreaming functional agrobiodiversity-based ESSs.

The MAP members in the FARMS4Biodiveristy project will be one of the main components of the proposed framework (Figure 9). This is to sustain their engagement in supporting the National Biodiversity Strategy and Action Plan II (2015-2025) and other related policies and/or strategies and mainstream agrobiodiversity-based ESSs. Sustainable engagement of MAP members after the project with other local stakeholders (e.g., farmers, researchers, extension workers, private sectors, NGOs) will improve the implementation of policies/strategies that support the relevant (agro)-biodiversity practices to provide multiples agroecosystems services. The benefits gained from (agro)-biodiversity services can contribute to achieve some of the United Nations Sustainable Development Goals (SDGs), for e.g., SDGs 1, 2, 13, 15. To this end, our research findings are in alignment with the national policies aimed to conserve (agro)-biodiversity and ESSs, but operational framework conditions need to be put in practice to track implementations of the policies and strategies.

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Integrating Policy and Institutional frameworks for mainstreaming Agrobiodiversity and Ecosystems Services in Malawi

Front page photos: Agro-ecological farmers practicing mulching for increased soil health (upper photo) *credit to SFHC* and Biodiversity survey using binoculars (lower photo) credit to Georg Küstner

Acknowledgements

This research was funded through the 2017–2018 Belmont Forum and BiodivERsA joint call for research proposals, under the BiodivScen ERA-NetCOFUND program, and funded by the Natural Sciences and Engineering Research Council of Canada (NSERC Grant# 523660-2018), National Science Foundation (NSF Grant #1852587), German Federal Ministry of Education and Research and the Research Council of Norway.