BOOK OF ABSTRACTS

I. SESSION DESCRIPTION

ID: S1d

Co-designing biodiversity measures with farmers: Dos and Donts

Hosts:

	Name	Organisation	E-mail
Host:	David Kleijn	Wageningen University and Research	david.kleijn@wur.nl
Co-host(s):	Ignasi Bartomeus		nacho.bartomeus@gmail.com
	Vincent Bretagnolle		vincent.bretagnolle@cebc.cnrs.fr
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Abstract:

Various approaches have been tried to maintain and improve farmland biodiversity and associated ecosystem service delivery. These include control and command approaches, financial incentives, media campaigns, labels but, so far, haven't resulted in larger scale adoption of biodiversity management by farmers. The most recent approach, that is recommended, is co-design. By involving farmers in the formulation of biodiversity and production goals and in the design of measures to be implemented, this should increase their motivation and hence also improve the biodiversity benefits. Ideally, there will even be win-win solutions, that maintain agricultural yields while increasing farmland biodiversity.

In this session, we will review empirical evidence on the success of the co-design approach. It will be centered around the experience gathered from 10 co-design studies that were conducted across Europe, involving 200 farmers, in the Horizon-2020 project SHOWCASE (showcase-project.eu), but it will be open to reports from additional co-design studies. Contributions will

be focused on the co-design process, on the benefits obtained for farmland biodiversity and for agricultural yield, and on the communication between researchers, farmers and the wider public.

Goals and objectives of the session:

The objective of the session is to answer the following questions:

1. What are the main learnings available to date for farmland biodiversity co-design projects?
2. Can we recommend to roll out the co-design approach in the context of the CAP and – if so – how could this be approached?

Planned output / Deliverables:

Participants will be invited to contribute to an opinion paper on the prospects of farmland biodiversity co-design

II. SESSION PROGRAM

Room: Expert Street 4

Date of session: 18th of November 2024

Time of session: 14:00-17:30

Timetable speakers

Time	First name	Surname	Organization	Title of presentation
14:00-14.15	Elena	Velado-Alonso	Wageningen University & Research, Netherlands	Lessons learned to effectively co-design biodiversity-friendly interventions in agriculture
14:15-14:30	Sonja	Kay	Agroscope, Switzerland	Agro4esterie: Agroforestry Living Labs in Switzerland
14:30-14:45	Iris	Bohnet	Czech University of Life Sciences, Czech Republic	Co-design as a key strategy to support biodiversity sensitive farming across Europe – Insights from the FRAMEwork project
14:45-15:00	Louise	Vercruysse	INBO, Belgium	Factors for a successful co-design of agri-environmental contracts: experiences from Contracts2.0

Time	First name	Surname	Organization	Title of presentation
15:00–15:15	Ferdaous	Rezgui	Leibniz Centre for Agricultural Landscape Research (ZALF), Germany	Stakeholders evaluate co-designed diversified Mediterranean farming systems
15:15–15:30	Verena	Scherfranz	BOKU University, Austria	It's not only about the money – Economic and non-economic costs of biodiversity measures for farmers
16:00–16:15	Vincent	Bretagnolle	CNRS, France	Experimenting nature-based solutions with farmers to improve yield, revenue and farm biodiversity
16:15–16:30	Philippe	Jeanneret	Agroscope, Switzerland	Implementing agroecological practices and biodiversity-based solutions to reduce pesticide use: successes and challenges of a co-design approach in the Swiss context
16:30–16:45	Niamh	McHugh	Game and Wildlife Conservation Trust, UK	Identification of Farmland Bird Indicator Species for Practitioner Monitoring in the United Kingdom
16:45–17:00	Reinier	de Vries	Wageningen University & Research, Netherlands	Loss of income constrains management for ecosystem services in agricultural grasslands

III.ABSTRACTS

The first author is the presenting author unless indicated otherwise.

1. Co-design as a key strategy to support biodiversity sensitive farming across Europe – Insights from the FRAMEwork project

First authors(s): Iris C. Bohnet

Other author(s): Niamh McHugh, Graham Begg

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Building on the Farmer Cluster approach which has evolved over the past decade in the UK as a solution to address ecosystem degradation and biodiversity loss at the landscape-scale, FRAMEwork, a Horizon-2020 project, established a network of 11 Advanced Farmer Clusters (AFCs) across Europe representing diverse farming systems in different social-ecological contexts. A new level of technical and scientific support is offered to the AFCs to provide space for collaboration, co-design, co-innovation, peer-to-peer learning, monitoring and evaluation via transdisciplinary learning processes. Farmers and land managers are central in these transdisciplinary research settings since they are actively intervening in the real-world by implementing (co-designed) biodiversity measures on their farms. However, evidence from the 11 AFCs suggests that involving a diversity of actors in the AFCs, including researchers from different disciplinary backgrounds and societal actors, for example, government officials, policymakers, value chain actors, social entrepreneurs, community groups, and civil society is critically important to their overall success. Illustrative examples from the 11 AFCs will be presented and implications discussed.

Keywords: landscape-scale management, living labs, biodiversity friendly farming, farmer collaboration, collaborative governance

2. Experimenting nature-based solutions with farmers to improve yield, revenue and farm biodiversity

First authors(s): Vincent Bretagnolle

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Modern agriculture requires a paradigm shift to make global food production sustainable while mitigating social and environmental externalities. Despite the recent implementation of various policies to limit the use of agrochemicals in the European Union, the use of both pesticides and fertilisers has remained fairly constant. In the European SHOWCASE project, we set up innovative experiments with farmers to explore a portfolio of Nature-based Solutions (NbS) options that offer pragmatic ways of simultaneously meeting food production and biodiversity conservation objectives while maintaining economically viable farming systems. NbS included reductions in pesticides and fertilisers, variations in sowing densities and modulations in soil management, and aimed to improve below- and above-ground biodiversity and ecosystem functioning through the provision of key ecological services. Experiments have been conducted with and by both organic and conventional farmers, and a panel of biodiversity and ecosystem function indicators have been monitored by the research team. Preliminary analysis shows that NbS either had no effect or slightly (but not significantly) reduced yields, demonstrating that reducing reliance on pesticides, fertilisers or soil treatments does not compromise crop production. Furthermore, quantification of gross margins from winter cereal and oilseed rape production showed that NbS is economically viable at field level in the short term, as current farm management in both organic and conventional farming (i.e. relying on agronomic practices) is not sufficient to offset the additional costs of its use. Our study thus helps to fill an important gap in our knowledge of NbS and provides hope for the implementation of win-win strategies for farmers and the environment.

Keywords: Biodiversity, Experiment, farmers, revenue

3. Loss of income constrains management for ecosystem services in agricultural grasslands

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Ecosystem services are at the very basis of agricultural production, yet few farmers manage for ecosystem service delivery by biodiversity. Instead, conventional farming relies on external inputs that are costly and often negatively affect biodiversity and associated ecosystem services. Enhancing biodiversity could provide win-win solutions for farmers and society, but farmers benefit only if ecosystem service benefits to farming outweigh the costs of biodiversity measures -including management and opportunity costs. We examined how the delivery of multiple ecosystem services relates to agricultural production and income for farmers in grasslands along a management intensification gradient in the Netherlands. To this end we measured ecosystem service delivery in the field and obtained yield and management data from farmer interviews.

We found a significant contribution of legume cover to production which can partially replace fertilizer inputs, and thus reduce environmental impacts whilst maintaining productivity. Nevertheless, ecosystem service contributions to forage production were relatively minor while management intensity maximized productivity as well as farmer income. This implies that most ecosystem services have to be considered public goods, most of which strongly trade off against farmer income. Maintaining these public goods is thus costly for farmers while their degradation causes societal costs. Our results indicate that halting the degradation of ecosystem services on farmland is unlikely to happen without societal support for public good delivery, that would make ecosystem service-enhancing management on farms economically rewarding.

Keywords: Ecosystem services, land-use intensity, public goods, biodiversity, carbon storage

4. Identification of Farmland Bird Indicator Species for Practitioner Monitoring in the United Kingdom

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Bird monitoring initiatives dedicated to the monitoring of common species during the breeding season commenced in the 1960s in Europe, growing to include around fifteen thousand volunteer birdwatchers, across 28 countries. Participating in a breeding bird survey can be challenging for novice birdwatchers as the methods employed are often complicated and require a high level of skill. This may limit their appeal and application, excluding potentially valuable participants such as farmers. Practitioner monitoring is an important activity carried out by Farmer Clusters, where groups of neighbouring farmers work together to deliver landscape-scale environmental benefits, but monitoring typically tends to focus on priority species making it difficult to interpret the wider meaning of these species trends.

There has been a growing appreciation of the role of indicator species in monitoring and assessing farmland ecosystem health. Indicator species are often more easily recognised by novice surveyors and using a narrower range of species in monitoring programs reduces expert surveyor costs and allows communication to focus on specific 'flagship' species whose conservation provides wider benefits to ecosystem health. Indicator species are, however, often selected without clear scientific justification or without clearly demonstrating their appropriateness as indicators of the taxa they are acting as a surrogate for (e.g. wider biodiversity).

Drawing on field data collected through the FRAMEwork project, a multi-institute, pan-European project assessing the impacts of Farmer Clusters on farmland biodiversity, possible farmland bird indicator species for lowland mixed farmland are identified. Their suitability as indicator species is assessed by evaluating relationships between these species and measures of specialist bird abundance and richness, as well as their relationships with wider bird abundance and richness. Monitoring of the selected indicator species was trailed by one Farmer Cluster and feedback sought to determine how willing and able farmers are to participate in indicator species monitoring.

Keywords: Farmer engagement, Citizen science, Biodiversity, Co-design, Ornithology

5. Visions for Biodiversity – Awareness of biodiversity and biodiversity measures of famers and foresters: A case study from Germany

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Ongoing environmental changes, such as biodiversity loss and climate change, also affect agriculture and forestry. At the same time, these are key sectors for the conservation and improvement of biodiversity. In Germany, 50 % of land use is ac-counted for by agriculture and 30 % to forests. However, so far, little is known about the perception and willingness of these actors to conserve biodiversity in the future.

We have thus carried out a socio-empirical study examining the attitudes and objec-tives of the actors with regard to nature and ecosystem services, the awareness of biodiversity loss as well as the willingness to actively implement biodiversity-promoting measures. We employed a quantitative survey with 500 farmers and 500 foresters in Germany.

The results show a high level of biodiversity awareness in agriculture and forestry. At 2.27, the value in forestry is slightly higher than in agriculture with 2.09 (scale 0-3). A large majority in both stakeholder groups have a high problem awareness (83% forestry, 67% agriculture), recognizes the urgency of biodiversity loss and feels personally responsible for doing something to protect biodiversity (81 % for-estry, 85 % agriculture). In both groups, there is a positive correlation between bio-diversity awareness and the valuation of ecosystem services: those who see a high benefit in biodiversity also have a greater awareness for the preservation of biodi-versity. The main challenges are the implementation of biodiversity-promoting measures rather than doubting the meaningfulness of the respective measures.

Bending the curve of biodiversity loss requires a broad commitment and new allianc-es between all actors involved. Our study provides a better understanding of how transformative practices and actions towards biodiversity conservation can be achieved by developing common objectives based on shared motivations for the protection of biodiversity.

Keywords: Biodiversity awareness, Forestry, Agriculture, Survey, Social-ecological research

6. Stakeholders evaluate co-designed diversified Mediterranean farming systems

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The quest for agricultural productivity has certainly increased the production, but it has come at the cost of natural resources (Egidi et al., 2022).To promote higher ecosystem services and biodiversity, diversifying rotations with legumes has been proposed as a viable measure (Reckling et al., 2023). Involving local actors when designing and evaluating those alternatives can enhance their transferability and likelihood of implementation (Chopin et al., 2021).

During a first workshop with local stakeholders, diversification options with grain legumes for specialized cereal systems were co-designed in Greece and Spain (Hossard et al., 2024). Using a set of agri-environmental, social and economic indicators, we assessed the performance of designed options in comparison to continuous cereal cropping. During a second workshop, stakeholders were presented with the assessment results and were asked to rate i) the importance of the assessment indicators and ii) the performance of the assessed systems.

In this study, we aim at presenting the results of the stakeholder's ratings using an Importance-Performance matrix (IPM) that measures the satisfaction of stakeholders (Phadermrod et al., 2019) towards the assessed farming systems (with and without legumes).

Greek and Spanish stakeholders rated economic indicators as most important, but not the actual economic performance of the systems (with and without legumes). Conversely, they ranked agri-environmental indicators as less important despite agreeing on the cropping systems performing better in terms of agri-environmental impacts. The stakeholders rated the farming systems highly for social performance, but they gave little importance to social indicators.

Legume integration as a co-design measure to support biodiversity is insufficient for stakeholders if it fails to generate a profit, regardless of how well the farming systems perform in terms of social or environmental impacts. Participatory processes offer stakeholders the opportunity to gain actionable knowledge, that affects their capacity for change and beforehand their willingness to change.

Keywords: diversification, legume, co-design, multi-criteria assessment, stakeholders

7. It's not only about the money - economic and non-economic costs of biodiversity measures for farmers

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This study aims to provide a comprehensive understanding of the economic and non-economic costs perceived by European farmers when implementing biodiversity measures under voluntary biodiversity programs. Recognizing the importance of farmers' long-term engagement for the effectiveness of these programs, we investigate diverse cost perceptions that might influence their continued participation. Given the heterogeneity of farming systems and farmer groups across Europe, the study employs Q methodology across four European regions: Estonia, Romania, the United Kingdom, and the Netherlands.

Through a combination of literature analysis and expert interviews, a Q set of 41 cost aspects was developed. 34 farmers participated in in-person interviews where they ranked these cost aspects, creating individual Q sorts reflecting their holistic views on the costs involved. These sorts were analyzed using the KADE software, which identified five distinct factors grouping farmers with similar cost perceptions. Elicited viewpoints showed that experiences are most impacted by perceived uncertainty, unproductiveness, lack of support, administrative burden, underpayment, or social non-conformity. Each factor thereby encompasses multiple cost types, indicating that perceived costs are multifaceted, involving economic, psychological, social, and management-related dimensions.

This exploratory approach reveals the complexity and plurality of farmers' viewpoints on costs, suggesting that policy adjustments are needed to address both monetary and non-monetary costs to ensure the sustainable participation of farmers in biodiversity programs. While financial compensation is crucial, this study highlights that it is not sufficient alone to address all costs. Management impracticalities and psychological burdens, such as administrative hassles and the loss of social and cultural capital, also play significant roles. Adjustments in program design,

such as result-based compensation to increase on-farm flexibility and biodiversity awards to enhance social appreciation, could mitigate non-economic costs. Further research is necessary to validate these findings and examine the impact of specific cost aspects on the continuation of these programs.

Keywords: Q-methodology; farmers‘ perceptions; biodiversity measures; monetary and non-monetary costs

8. Lessons learned to effectively co-design biodiversity-friendly interventions in agriculture

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Integrating biodiversity conservation into agriculture is a priority issue in our society. Integrating biodiversity into agricultural management has been shown to promote conservation and secure nature's contribution to people. Transdisciplinary approaches are considered beneficial to address the complexity of interacting factors that determine the success of biodiversity-friendly interventions in agricultural landscapes. As a result, co-design of these interventions has gained momentum worldwide in recent decades. Many benefits are expected from the co-production process, such as knowledge sharing among stakeholders, behavior change among practitioners, and increased opportunities access to rare resources for researchers, such as sites. However, there are often associated disadvantages, such as tokenistic involvement, increased financial costs or time commitment. In this paper, a group of 20 researchers from different disciplines (including natural and social sciences) with extensive experience of co-production processes in the biodiversity-agriculture nexus reflect on the difficulties and solutions they have found in their practice. Together we have developed specific and practical guidelines to stimulate ideas, expand research and impact opportunities, and mitigate risks in participatory research with farmers and other agri-environmental stakeholders. We share our experience on how to select project facilitators, participants and intermediaries to ensure project development. We also provide practical advice on how to promote stakeholder engagement, reduce unwanted conflict and create a project legacy by assessing the feasibility of engagement, establishing common goals, managing conflicts of interest and using effective

communication strategies that tap into social networks. These ideas are based on the experience of 9 different research projects developing co-design in 12 different countries from Africa, Asia, Europe and South America, and literature reviews.

Keywords: Agriculture, Biodiversity, Co-design, Conservation, Participatory research

9. Factors for a successful co-design of agri-environmental contracts: experiences from Contracts2.0.

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In pursuit of innovative strategies to achieve biodiversity goals in agricultural landscapes, as proposed by the CAP, numerous initiatives are now incorporating policy co-design alongside farmers. However, the success of these projects varies significantly (Oliver et al., 2019).

The Horizon 2020 project Contracts2.0 was launched to enhance the effectiveness of agri-environmental contracts by co-designing new contracts incorporating elements such as results-based payments, collective contracts, and land tenure agreements. This initiative involved the establishment of 11 Contract Innovation Labs and 9 Policy Innovation Labs across 9 European countries, where farmers and other stakeholders collaborated with researchers and policymakers to develop and implement "dream contracts" through participatory methods.

Following the project's conclusion, several partners committed to evaluating the co-design process of Contracts2.0. This evaluation aimed to identify key factors essential for successful co-design, while also considering the political position and power relations among the involved stakeholders, an element often left out (Turnhout et al., 2020).

By analyzing interviews with lab coordinators, reports generated by the innovation labs, and the overall project evaluation, we identified critical elements that contribute to a "successful" co-design process. The term "successful" is subjective, and the initial phase of our analysis focused on how coordinators and participants define this concept. Generally, successful co-design

encompasses a combination of material outcomes (e.g., the creation of new contracts) and relational benefits (e.g., fostering social capital). The paper presented examines the realization of these outcomes across three domains of the co-design process: the design and coordination of the process, the actors involved (research partners and action partners), and the interactions among these actors (eg., facilitation, knowledge exchange, reciprocity and agency). Finally, the salient factors are discussed and compared to the existing literature concerning policy co-design. In our presentation, we look forward to compare and discuss our findings to other projects, such as Mosaic and the Showcase project, following a similar approach.

Oliver K, Kothari A, Mays N: The dark side of coproduction: do the costs outweigh the benefits for health research? Health Res Policy Syst 2019, 17:33 http://dx.doi.org/10.1186/s12961-019-0432-3.

Turnhout E., Metze T., Wyborn C., Klenk N., Louder E.: The politics of co-production: participation, power, and transformation. Current Opinion in Environmental Sustainability, Volume 42, 2020, Pages 15-21, ISSN 1877-3435, https://doi.org/10.1016/j.cosust.2019.11.009.

Keywords: co-design, participatory research, agri-environmental contracts, biodiversity, innovation labs, policy co-design

10. Implementing agroecological practices and biodiversity based solutions to reduce pesticide use: successes and challenges of a co-design approach in the Swiss context

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By joining SHOWCASE (Horizon 2020) and PestiRed (Swiss Federal Office of Agriculture) projects, biodiversity-based solutions and agroecological practices have been implemented on 65 farms of three arable regions on the Swiss plateau since 2020, following a 6-year crop rotation.

The first step of the co-design process consisted in workshops gathering scientists, extension services, and farmers interested to reduce pesticide use. Condition for participating in the project are: reduce by 75% the pesticide use without cutting yield by more than 10% by implementing agroecological practices e.g. wildflower strips, undersowing on one field in which practices, yield, and noxious organisms (weeds, pests, diseases) are recorded as well as on a control field conventionally managed. A flat-rate package is being paid the farmers for monitoring activities whereas practice-specific payments are allocated. Secondly, 1-2 yearly regional workshops were conducted. Thirdly, field days were organised with farmers tackling issues regarding a given crop.

After four years, outcomes of the co-design approach show: 1) yearly workshops produced highly valuable discussions about successes and failures of specific practices and stimulate farmers to exchange in structured meetings; 2) support of extension services to innovative farmers is intensified; 3) farmers are informed by scientists on results at regional and national scale; 4) scientific narrative helps farmers understand biodiversity and its crucial role for sustainable production.

Challenges are: 1) farmers were initially resistant to change arguing their rotation was already agronomically optimized to respond to economic constraints of the Swiss agriculture; 2) some practices targeting biodiversity (e.g. wildflower strips) are not convincing, frequently due to implementation failure; 3) every farm and field is a particular case of environmental conditions such as soil types which render generic implementation difficult; 4) farmers are keen to receive particular recommendations which is time consuming for advisors and scientists; 5) farmers have little time for monitoring of practices and noxious organisms.

Keywords: SHOWCASE, agroecology, co-design, pesticides, agricultural practices

12. Agro4esterie: Agroforestry Living Labs in Switzerland

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Modern agroforestry systems are known for their contribution to promoting the environment and mitigating climate change. While scientists are in favour of their implementation because of their ecosystem service benefits, farmers see both opportunities and challenges.

The transdisciplinary research programme "Agro4esterie" was launched in 2020, funded by the Swiss Federal Office for Agriculture and four cantons, to support around 100 farmers during the first six years of the practical start-up of agroforestry fields and ensure a regular transfer of knowledge (practice, science, administration). The developments are co-designed and monitored over eight years.

In the starting phase, farmers needed significant support to familiarise themselves with these production systems and it took several years between idea and implementation. Farmers valued the input by farm advisers and scientist, and also the exchange among themselves. However, the cooperation was not always easy, as different expectations met different ways of working. E.g. practitioners expected scientific results after only 1-2 months, from an intensive 4 months data collection campaign by scientists. On the other hand, scientists expected to have unhindered access and that measurements would not be disturbed by farm management activities, while in practice the only sunny week for recordings was also used by the farmers for harvesting.

Overall, we can say that the co-design process requires a lot of effort and openness from both sides and that we still have a long way to go. But we have also had and continue to have, positive and motivating collaborations. The presentation will highlight some very practical – and all the more relevant – challenges that we faced and present lessons learned for both, science and practice.

Keywords: agroforestry, co-design-process, environmental impacts, climate change, policy advise