EFFECT FINAL EVENT

Brussels, 4° October 2023

Europaregion Tirol-Sudtirol Trentino, h 9-13

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817903.

Environmental Public Goods **F**rom **F**arming Through **E**ffective **C**ontract **T**argeting

Mette Termansen, UCPH

EFFECT End Meeting
October 4, 2023

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817903.

BACKGROUND FOR THE PROJECT

Agri-Environmental Schemes have, since the 1990s, been the primary policy instrument to meet environmental and climate objectives in Europe by supporting farmers to adopt more sustainable practices.

Little evidence of their success and the call asked for a review of lessons learned as well as designing and testing new forms of AES

Traditional AES are based on uniform payments in return for adoption of specific management intervention

Traditional AES "payment & adoption agreements" (i.e. the contracts) are between a government agency and the individual farmer

Farmers are compensated for the costs of adoption and income forgone

BACKGROUND FOR THE PROJECT

KEY CHALLENGES AND TRADE-OFFS IN DESIGN:

Tension between income support function and environmental performance

Agri-environmental schemes are voluntary – participation is essential, but additionality of the schemes have been challenged

NPS

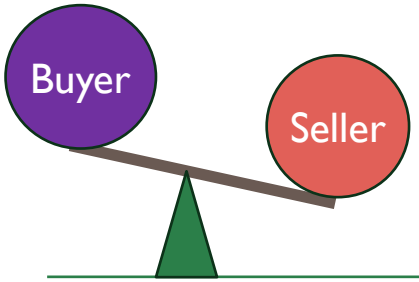
Non-point source pollution – challenging to regulate

BACKGROUND FOR THE PROJECT

KEY CHALLENGES:

Heterogeneous agri-environmental landscapes – targeting is essential for environmental and cost-effectiveness

Social norms and institutions demands that both voluntary and mandatory schemes should be **fair**



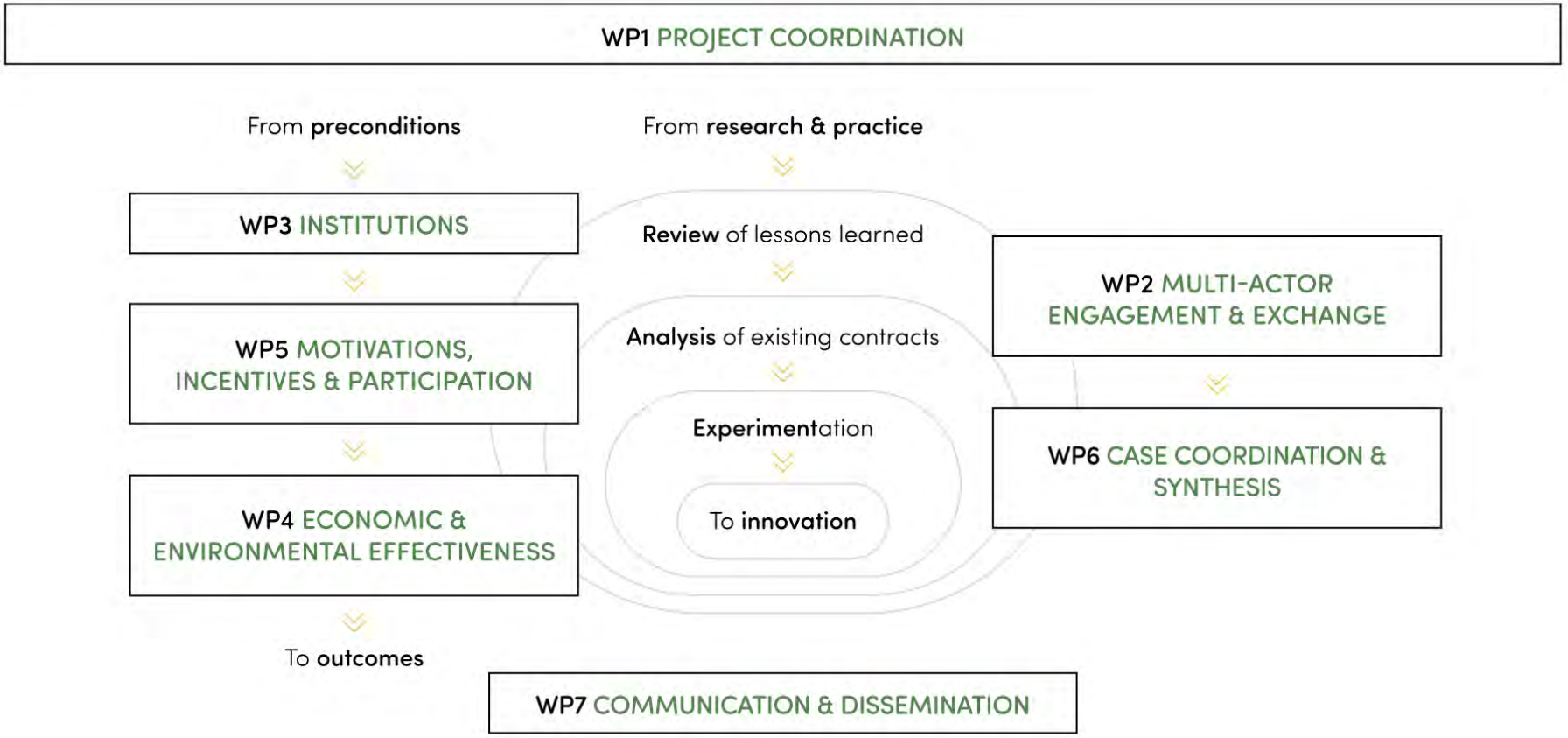
Asymmetric **information** between farmers and agency – design and monitoring challenges

KEY TERMINOLOGY

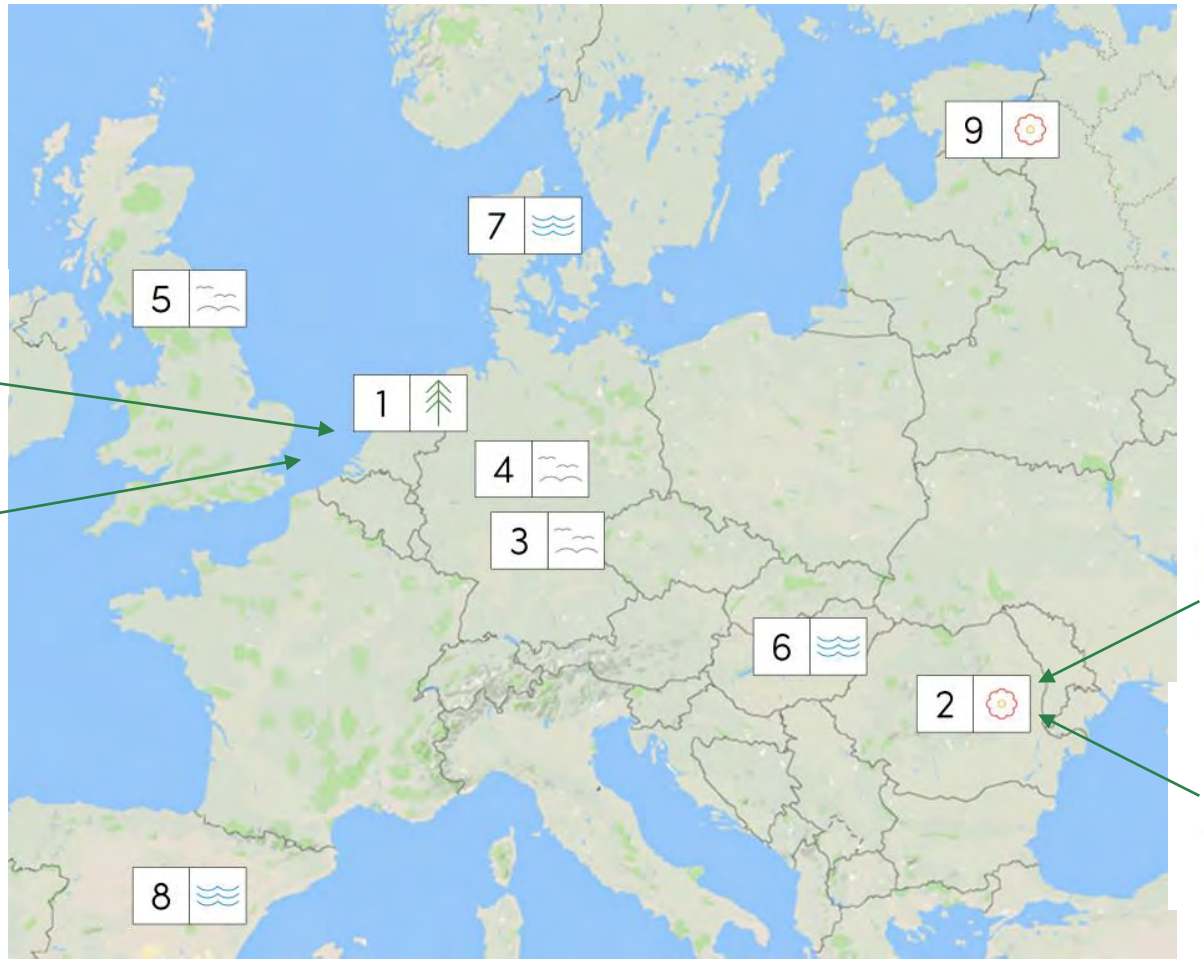
RESULTS vs. PRACTICE	Results-based AES are contracts where payment is wholly or partly dependent on outcomes being achieved. Farmers are directly incentivised to deliver the outcomes. The more outcomes they deliver, the more they will be paid. Practice-based AES are contracts where payments are based on the management practises undertaken with expected effect on the desired outcome.
INDIVIDUAL vs. COLLECTIVE	Individual contracts are between an individual farmer and the contracting agency Collective contracts are contracts where the payments are designed to take into account the behaviour of groups of farmers. These include a continuum of contract types that directly or indirectly seek to incentivise collaboration/coordination for sustainable outcomes.

Who are involved

EFFECT – project organisation



EFFECT – Cases



WAGENINGEN UNIVERSITY & RESEARCH

Noardlike Fryske Wâlden

Universitatea Ştefan cel Mare Suceava

FUNDATIA ADEPT

EFFECT – how do we test contracts

Policy Cycle

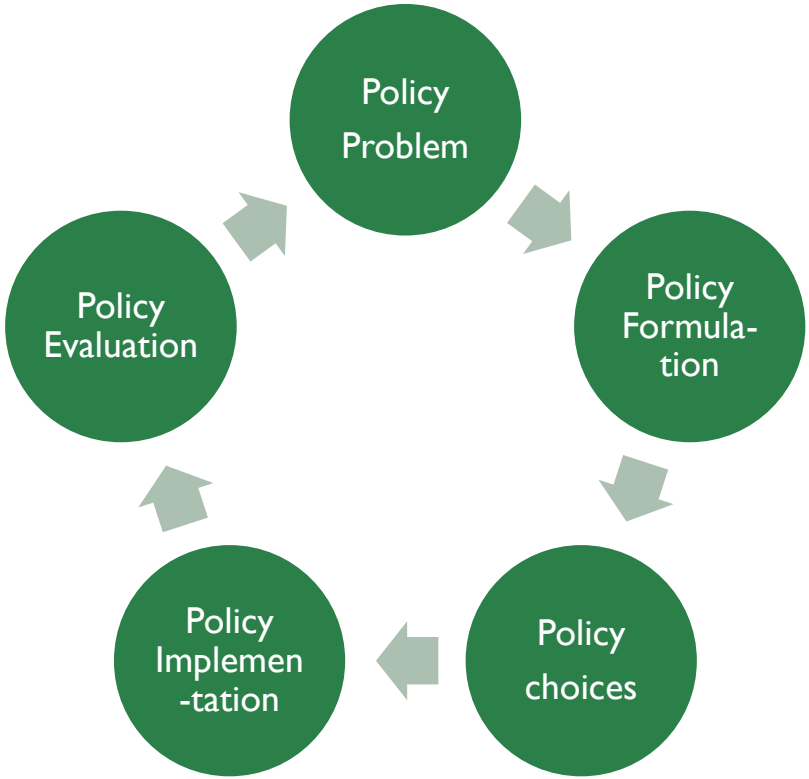
EXSISTING SCHEMES

Statistical economics & environmental impact evaluation

Interviews/surveys with stakeholders about their experiences

Country case comparisons

Ecological surveys



NEW SCHEMES

Environmental–Economic modelling

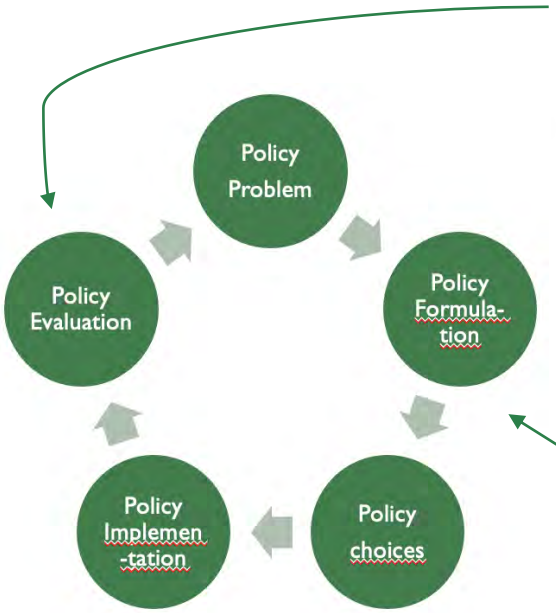
Surveys

Social experiments

Cost-effectiveness Analysis

Ecological treatments

Plan for the day



9:00-9:15: Welcome: Setting the scene for the seminar (Mette Termansen)
9:15-9:30: Conceptual Framework analysis of AES impacts (Sven Wunder)
9:30-9.45: Questions

Existing AES

9.45-10.00: Analysis of existing AES contract implementation (Giulia Bazan)
10.00-10.15: The Dutch collective scheme (Liesbeth Dries)
10.15-10.30: Bavarian results-based schemes (Philipp Mennig)
10:30-10.45: Questions

10.30-11.00: Coffeee Break

Exploring AES Innovation

11.00-11.15: Hybrid AES schemes- practice and outcome(Carolin Canessa)
11.15-11.30: Paying for modelled results (Nick Hanley)
11.30-11.45: Combining carrots and sticks (Mette Termansen)
11.45-12.00: Novel design mechanisms to increase effectiveness of AES (Uwe Latacz-Lohmann)
12.00-12.15: Questions

Implications for policy and practice:

12.15-12.30: Observations from sister projects: Console & Contract2.0
12.30-13: Questions & Discussion

13.00: Light Lunch

A CONCEPTUAL FRAMEWORK FOR ANALYZING AES IMPACTS

Brussels, 4 October 2023

Sven Wunder, with Cecilia Fraccaroli & Mette Termansen

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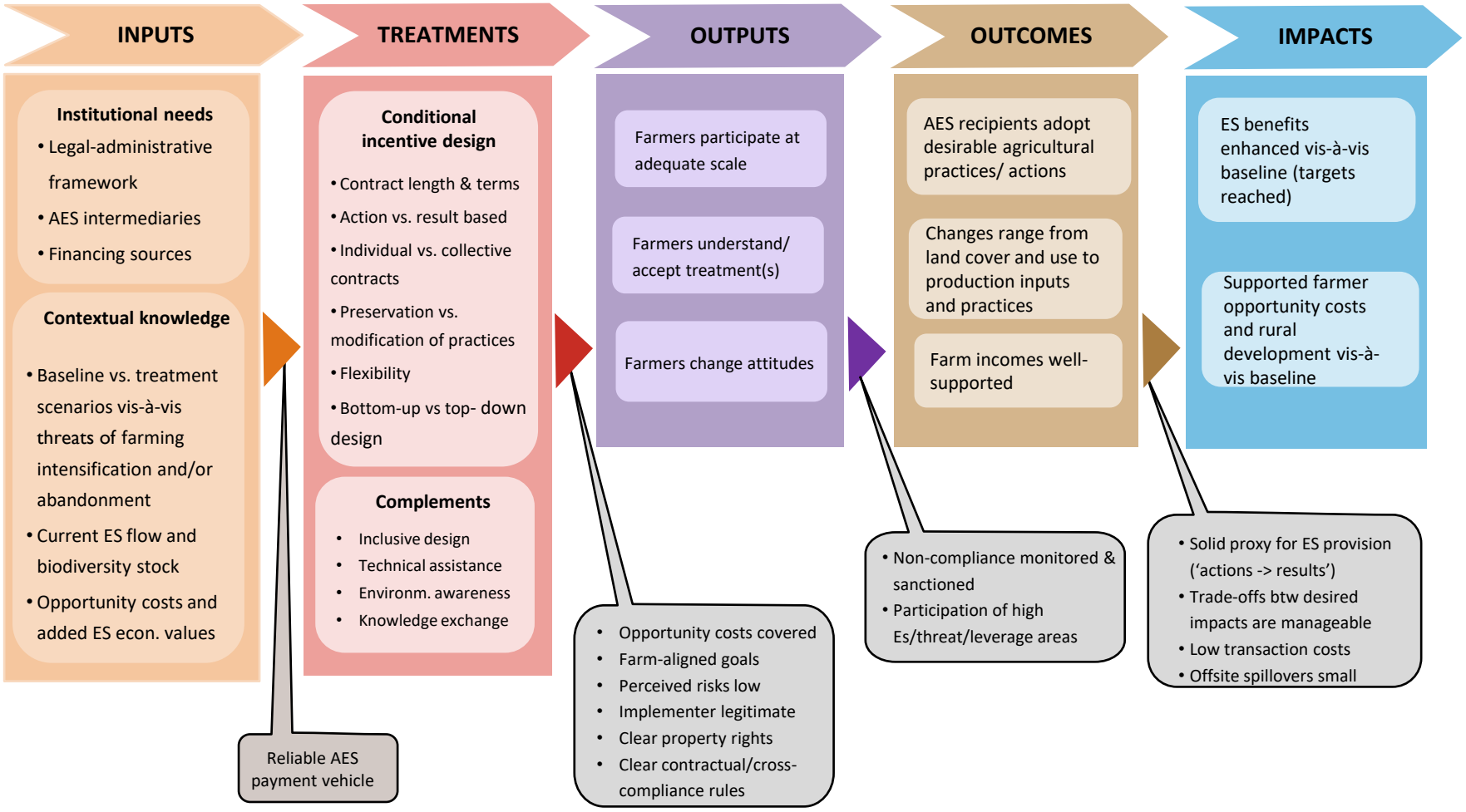
AES THEORY OF CHANGE



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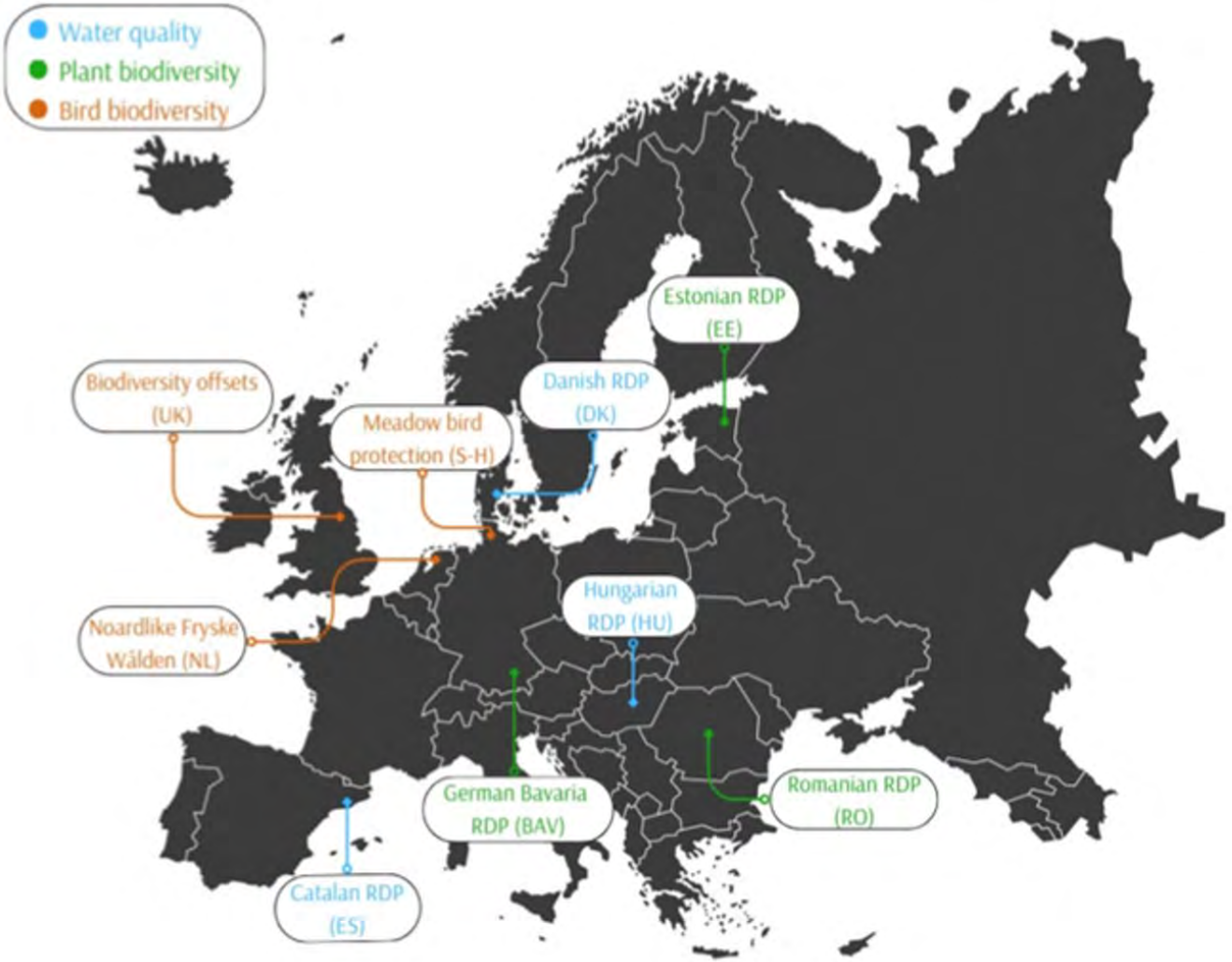
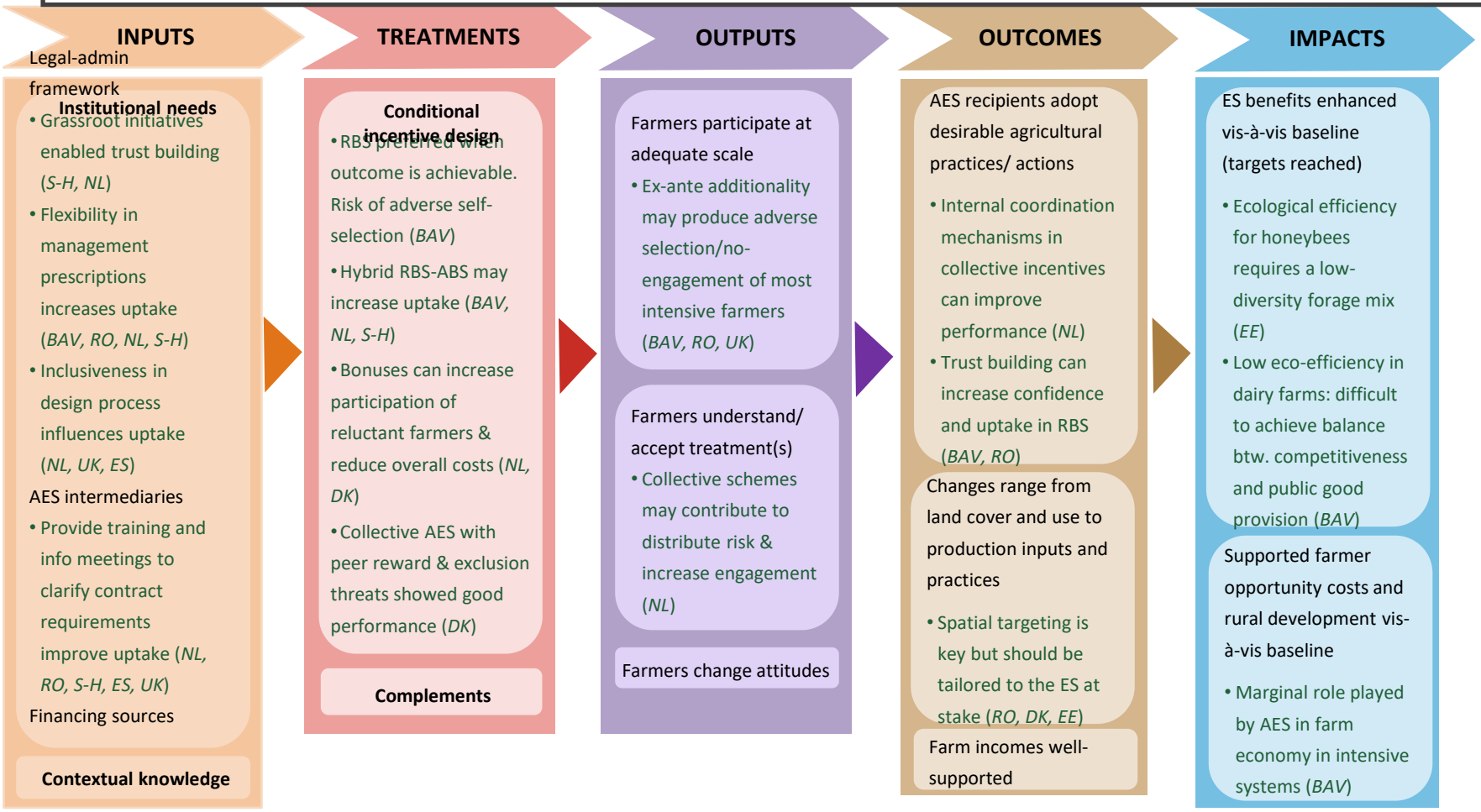
Case studies



AES FEATURES ASSESSED IN OUR 9 CASE STUDIES

AES features	NL	RO	BAV	S-H	UK	HU	DK	ES	EE
Individual vs. collective schemes	X					X	X		
Result- vs. action-based/ hybrids	X	X	X	X			X		
Investment in environmentally friendly technologies						X		X	
Performance of ES/biodiversity markets					X		X		
Farmer preferences and adoption	X	X	X			X	X	X	X
Institutional set-ups	X	X	X	X		X		X	X
Role of intermediaries	X			X					
Transaction costs	X					X			
Dependence on ecological/landscape conditions			X		X		X		X
Environmental efficiency			X			X	X		
Cost effectiveness	X		X		X		X		
ES & biodiversity metrics in programme design					X		X		X
Spill-over effects on other ES/biodiversity targets					X		X		

CASE LESSONS VIS-A-VIS OUR THEORY OF CHANGE



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SCHEME DESIGN AND PARTICIPATION

- Farmer uptake depends on flexible contracts & alignment of AES requirements with farming practices…
- …but excessive alignment reinforces adverse self-selection biases, leading to low AES additionality
- Intensive farmers have higher opportunity costs: less likely to take up AES regardless of design
- **Add-on features** might persuade more farmers to enroll:

- additional 'carrots' (e.g., bonus payments),
- potential 'sticks' (e.g., exclusion or regulatory threats)
- peer pressures (e.g., in collective schemes).

ACTION- VS. RESULT-BASED CONTRACTS

- **Paying for actions**
  - Preferred by farmers for the secure payment
  - Convenient in watershed AES (ES uncertainty & costly to measure)
- **Paying for results**
  - Preferred by environmentally inclined & extensive farmers
  - Sometimes implementable in biodiversity AES
- **Hybrid AES** (mixing payments for actions and results) are quite promising

OTHER AES DESIGN FEATURES

- **Differentiating AES payments:** higher incentives for conserving most valuable and/or most threatened sites in a landscape, rewarding pre-compliant farmers while also betting towards additionality
- **Spatial targeting:** essential for improving environmental quality also in intensive farming systems → Locally adapted through regional AES
- **Combining multiple outcomes** could maximise the environmental gains, but is complex: more intricate management prescriptions, increased coordination and commitment by farmers → more feasible in smaller schemes

WHEN WILL AES DELIVER ON THEIR GOALS?

		1. Meet desired AES conditions without payment?	
		No	Yes
2. Apply for AES payment?	No	**Too high opportunity costs** BAV, NL, UK, ES, DK, HUN	**Intrinsic motivation** NL, RO
	Yes	**Additionality** S-H, EE, NL, DK, UK	**Adverse selection bias** BAV, RO, UK, NL

Inspired from the PES literature: Persson & Alpizar (2013)

Success measures / Contracts features	Farmer uptake	Farmer welfare	Environmental impact	Cost-effectiveness
Action-based	Secure payment	Predictable income	Indirect link to ES	Less ES delivered Low-cost monitoring
Result-based	Higher risk More flexible management	More effort & risk Local knowledge integrated	Direct link to ES	More ES delivered Expensive to monitor
Individual scheme	More predictable	More predictable rise, individualism	Low ES contiguity	More contracts, more transaction costs
Collective scheme/ participation bonuses	Transaction costs added vs bonus paid	Joint coordination, bonus paid but free-riding risk	High ES contiguity	Fewer contract costs Bonus costs. Higher costs for collectives
Spatial targeting of eligible farmers	Fewer farmers participate	Some farmers not eligible – can be perceived as unfair	Increased ES	More value for money Added targeting costs
Differentiated payment mechanisms	Agency co-determines uptake	Reduced rents	Increased ES	More value for money Added targeting costs

HOW MUCH (A)ES 'BANG FOR THE BUCK'?

- Most empirical case-study research in middle part of ToC, i.e. from treatments to outputs (e.g. farmer participation), and sometimes outcomes (e.g. land-use changes)
- Very few 'hard' ex-post impact evaluations of environmental or socio-economic effects (those we have, with mixed record)

-> How much do 'we' (as society) really want to know about the environmental bottom line of AES?

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THANK YOU!

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817903.

EFI

PRINCIPLES FOR DESIGNING EFFECTIVE ECO-SYSTEM SERVICE DELIVERY MEASURES

Giulia Bazzan (KU), Jeroen Candel (WUR), Carsten Daugbjerg (KU)

WP 3 - Institutions

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817903.

TYPES OF ECO-SYSTEM SERVICE DELIVERY MEASURES

	ACTION-BASED	RESULTS-BASED
INDIVIDUAL	Least successful type	Intermediate
COLLECTIVE	Intermediate	Most successful type

TYPES OF ECO-SYSTEM SERVICE DELIVERY MEASURES

	ACTION-BASED	RESULTS-BASED
INDIVIDUAL	Catalan case (unsuccessful), Estonian case (unsuccessful)	Romanian case (successful), Bavarian case (successful), Hungarian case (unsuccessful)
COLLECTIVE	Dutch case (successful)	

HOW SUCCESSFUL ARE ECO-SYSTEM SERVICE DELIVERY MEASURES?

	High capacity to overcome barriers	Low capacity to overcome barriers
Uptake increased (or very high)	Dutch case, Romanian case	Bavarian case (intermediate capacity)
Uptake decreased (or very low)		Hungarian case, Catalan case, Estonian case

SUCCESSFUL INDIVIDUAL RESULTS-BASED AES

- A result-based grassland conservation scheme targeting plant species conservation has recently been initiated as part of the regional agri-environment program in the state of Bavaria, in Germany. Farmers signing up are paid if a number of predefined plant species were found ex post on their land. The results-based scheme is being piloted during the programming period 2015-20.
- A pilot AES was running in Romania between 2015 and 2019, led and implemented by the non-governmental organization ADEPT Foundation, and financed by DG Environment and Deutsche Bundesstiftung Umwelt (DBU). Thirty species have been selected and tested as biodiversity indicators of high nature value meadows in the pilot scheme regions. Individual farmers uptaking the scheme are paid by results of measured species diversity on their farms and have the freedom to choose management practice according to local conditions.

SUCCESSFUL COLLECTIVE ACTION-BASED AES

- The Dutch Rural Development Program finances a wide variety of measures, mainly concerning restoration, conservation, and enhancement of ecosystems related to agriculture. The program has a strong ecological perspective and aims at promoting biodiversity and improving water and soil management. Within this framework, the Dutch agricultural landscape management scheme evolved under the 2014 EU Rural Development Regulation, which introduced the option of group applications for agri-environment-climate measures (Regulation EU 1305/2013, Art. 28). As a result, since 2016, only joint applications (through agrarian/nature collectives) became eligible for subsidies for agri environmental management. The agrarian collective submits a territorial application that specifies which agri-environmental activities the collective (and its members) will perform in their territory, and how these will contribute to the realization of the goals of the provincial nature management plan. Collective subsidies will be granted only after the province has approved the territorial application.

HOW ARE AES DESIGNED?

Case	Participation in design	Role definition	Flexibility	Bottom-up or top-down	Knowledge exchange
Catalan	Stakeholder consultation	Clearly defined, no overlapping	Rigid implementation	Top-down	Information provided through technical offices
Estonian	Limited involvement through working groups	Clearly defined, no overlapping	Rigid implementation	Top-down	Full information and training provided; collaboration
Hungarian	Limited stakeholder involvement	Clearly defined, no overlapping	Rigid implementation	Top-down	No information provided; no collaboration

HOW ARE AES DESIGNED? (II)

Case	Participation in design	Role definition	Flexibility	Bottom-up or top-down	Knowledge exchange
Romanian	Stakeholder consultation	Clearly defined, no overlapping	High flexibility in implementation	Bottom-up	Full information and training provided; collaboration
Bavarian	Stakeholder consultation	Clearly defined, no overlapping	Rigid implementation	Top-down	Full information but limited advice; no collaboration
Dutch	Stakeholder consultation	Clearly defined, no overlapping	High flexibility in implementation	Bottom-up	Full information and training provided; collaboration

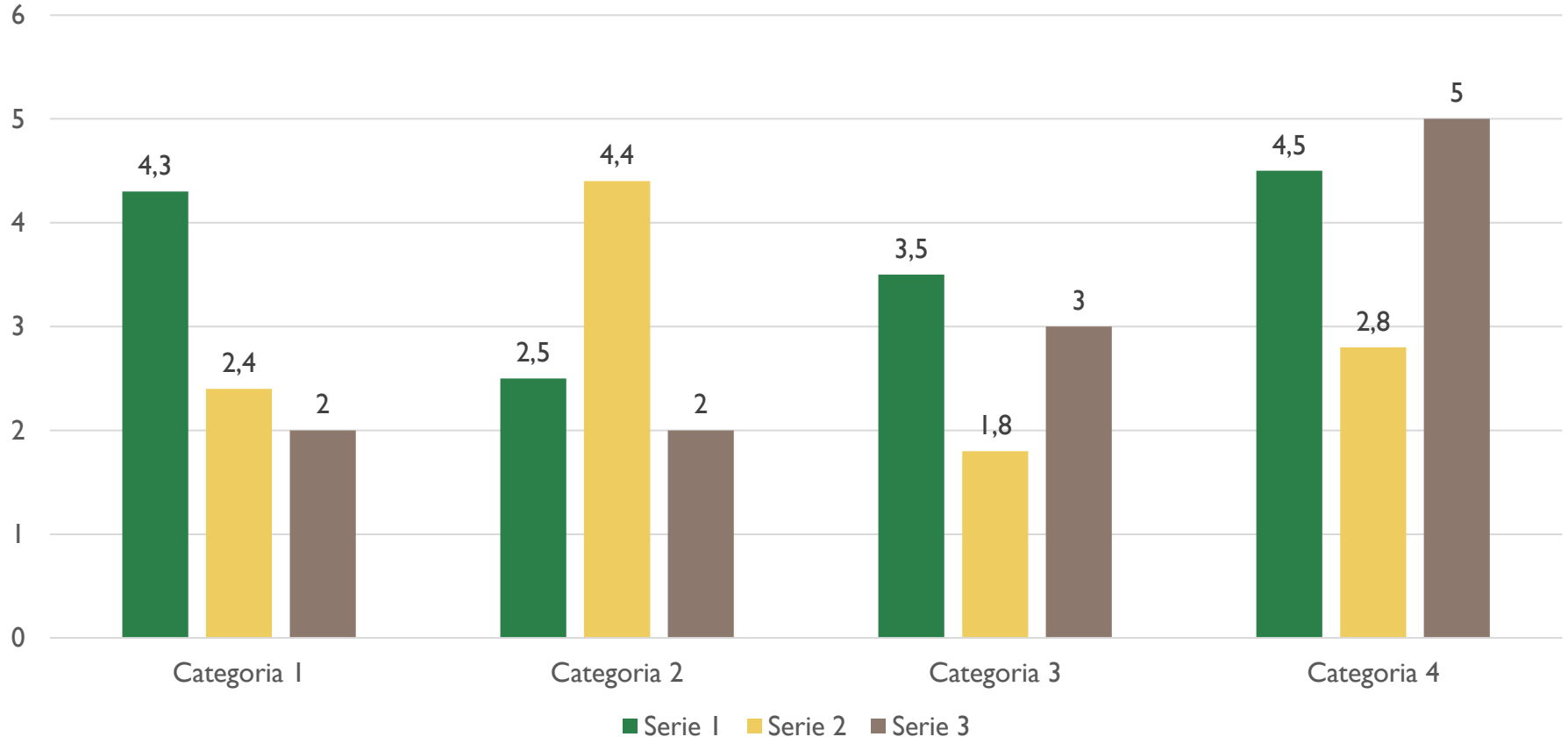
HOW EFFECTIVE IS THE DESIGN OF ECO-SYSTEM SERVICE DELIVERY MEASURES?

	INCLUSIVE DESIGN PROCESS		NON-INCLUSIVE	
	FLEXIBLE IMPLEMENTATION	NON FLEXIBLE	FLEXIBLE	NON FLEXIBLE
HIGH KNOWLEDGE EXCHANGE	Dutch case Romanian case			Estonian case
LOW KNOWLEDGE EXCHANGE		Bavarian case		Hungarian case Catalan case

CONCLUDING REMARKS

- Empirical contribution → Wide diversity in design and implementation success
- Theoretical contribution → Implications of intermediate conditions
- Methodological contribution → Configurational comparative approach
- Practice contribution → policy brief
- Potential further research → collective results-based measures, expanding population of cases, investigating other conditions

CATEGORIES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Categoria 1
Categoria 2
Categoria 3
Categoria 4
Serie 1
Serie 2
Serie 3

THE COLLECTIVE SCHEME IN THE NETHERLANDS

Final event EFFECT, 4 October 2023

Liesbeth Dries, Wageningen University

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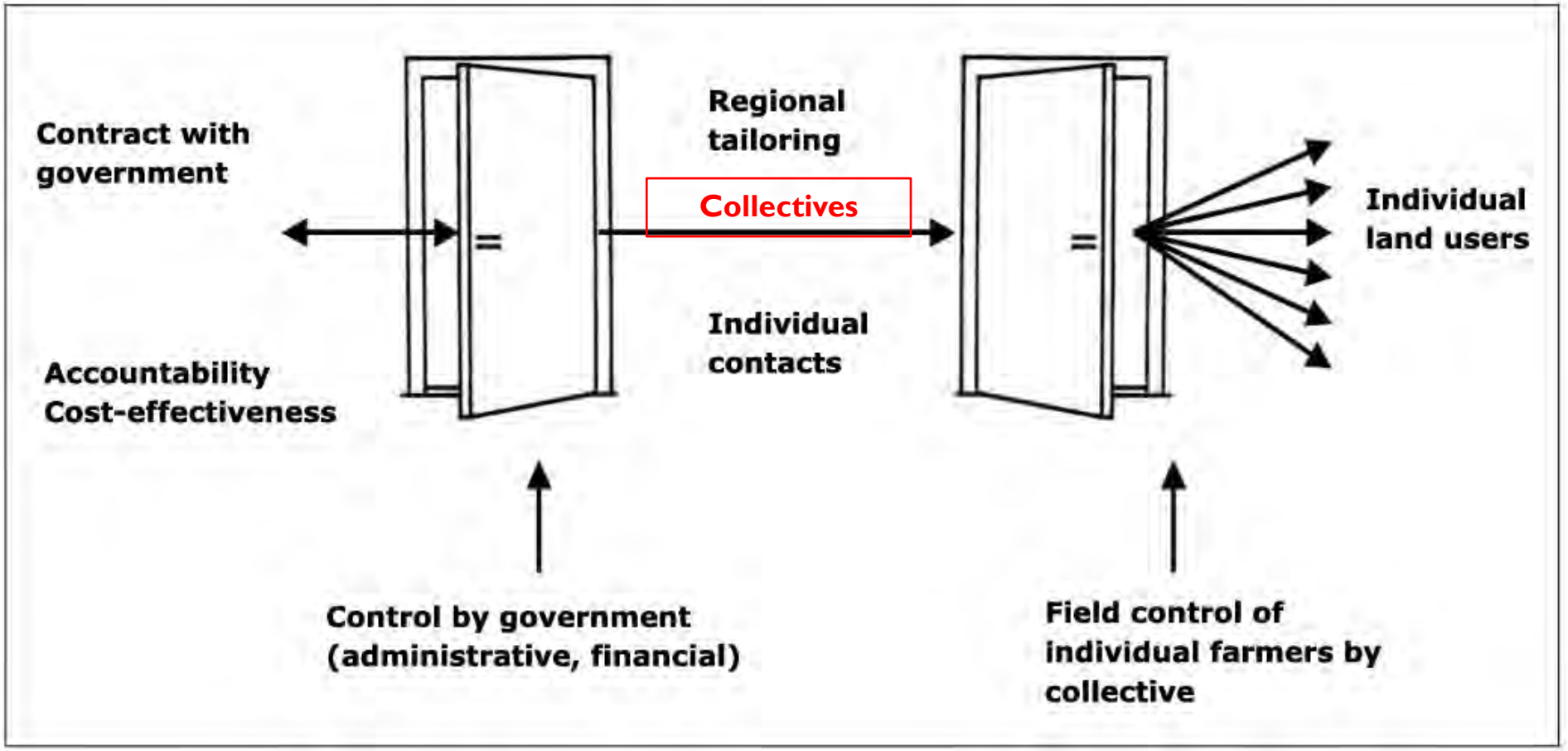
INTRODUCTION

- Criticism on **agri-environmental schemes (AES)** for being ineffective when it comes to creating **landscape-level ecosystem services** (for instance, landscapes attracting migratory birds)

SINCE 2016, AES ARE IMPLEMENTED THROUGH **40 COLLECTIVES** IN THE NETHERLANDS

THE FRONT-DOOR BACK-DOOR APPROACH



AES COLLECTIVES AS SPATIAL COORDINATORS

- **Farmer collectives in the NL** form an integral part of the AES system as **spatial coordinators**:

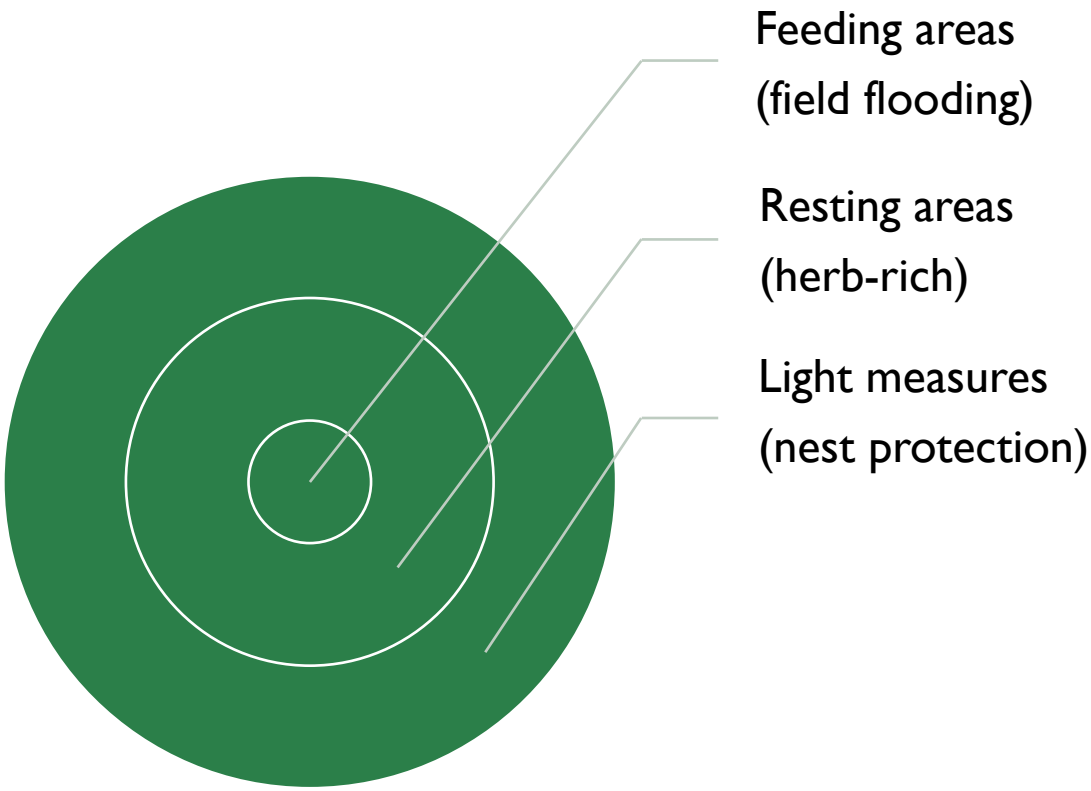
  They identify areas within the collective's territory that are best suited for bird conservation (based on local knowledge)

  Only the **farmer-members in this area are invited** to participate in the meadow birds AES

  A diversity of landscape elements (ponds, hedges, herb-rich grassland...) attracts more birds; farmers receive different payments for different elements; the **collective coordinates** this

AES COLLECTIVES AS SPATIAL COORDINATORS

- Spatial coordination for meadow birds – the "mosaic", implemented by farmer collectives on fields of member-farmers



INSIGHTS FROM THE EFFECT PROJECT

- On effectiveness…
- On transaction costs…
- On participation in result-based versus action-based schemes…

… in the context of AES collectives

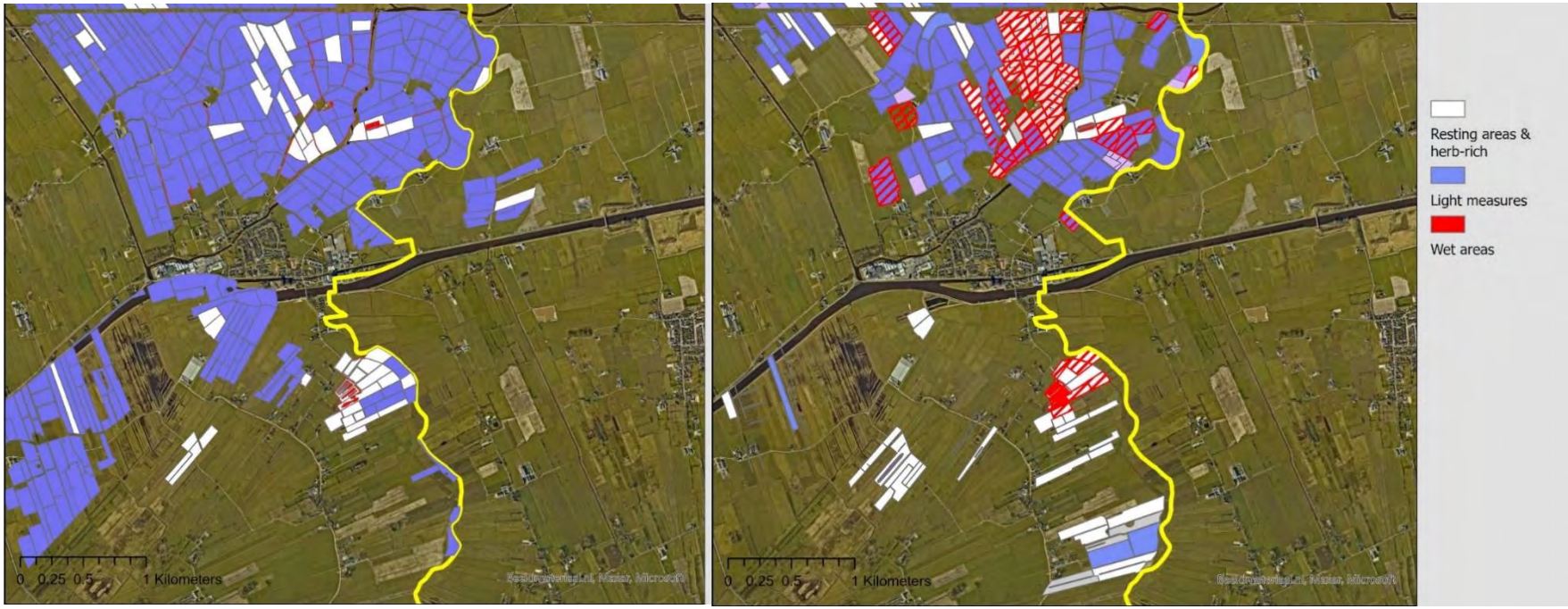
EFFECTIVENESS OF AES COLLECTIVES

Mosaic A of the collective NFW in 2016	Mosaic A of the collective NFW in 2021

Source: Dries and Splinter (2023)

EFFECTIVENESS OF AES COLLECTIVES

Mosaic B&C of collective NFW in 2015	Mosaic B&C of collective NFW in 2021



Source: Dries and Splinter (2023)

TRANSACTION COSTS (TC) IN THE COLLECTIVE SCHEME

- The transition from the individual to the collective AES has **shifted TC from public actors to collectives** (overall TC may have increased or decreased)

- The success of the collective approach depends on the efforts of **volunteers** in the field (TC not reported)

- The collective approach is strongly **embedded in rural areas in the Netherlands**. This may have implications for the replicability to other contexts.

Source: Splinter and Dries (2023)

RESULT-BASED VERSUS ACTION-BASED AES

- Preference for hybrid over a purely result-based scheme

  b/c uncertainty (predators, weather…) and the need for different types of measures (actions)

- A hybrid contract was tested including:

  Collective bonus paid out if bird counts of the collective exceed the regional average

  Individual bonus for farmers for specific measures

- Results: Collective bonus can increase focus on results, but bonus needs to be high

Source: Thiermann et al. (2023)

THANK YOU FOR YOUR ATTENTION!

EFFECT

REFERENCES

- Dries, L. and M. Splinter, 2023. "Coordinating the implementation of environmental policies for biodiversity: The agri-environmental collectives in the Netherlands", submitted to *Journal of Institutional Economics*.
- Splinter, M. and L. Dries, 2023. "A conceptual framework for measuring transaction costs in agri-environmental schemes: an application to the Dutch collective scheme", *Journal of Environmental Planning and Management*, https://doi.org/10.1080/09640568.2023.2218989
- Thiermann, I., Silvius, B., Splinter, M. and L. Dries, "Making bird numbers count: Would Dutch farmers accept a result-based meadow bird conservation scheme?", Ecological Economics, 214, https://doi.org/10.1016/j.ecolecon.2023.107999

RESULT-BASED SCHEMES IN BAVARIA, GERMANY

Philipp Mennig & Carolin Canessa, Technical University of Munich

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817903.

NOVEL DESIGN MECHANISMS – OVERVIEW

(1) Collectively organized nature conservation

(2) Payment by results: rewarding farmers for conservation outcomes rather than activities

(3) Conservation auctions: allocate contracts through competitive bidding

(4) Spatial coordination of conservation activities

(5) Social norms interventions: Securing environmental gains in the long run

INTRODUCTION

(Theoretical) advantages of result-based schemes compared to action-based approaches:

(1) encourage farmers to innovate to produce environmental goods

(2) ensure that farmers are paid for provision of environmental services rather than for performing management

(3) raise the intrinsic interest of farmers in achieving environmental objectives (social capital)

(5) provision of ecosystem services becomes an integral part of the farmers' systems and businesses

(4) provide opportunities for individual, flexible and site-specific solutions

(6) potentially achieve environmental improvements at lower public and private costs

CASE STUDY: RESULT-BASED CONSERVATION OF SPECIES RICH GRASSLAND IN BAVARIA

Since 2015, the Federal State of Bavaria offers a **result-based measure aiming at maintaining species rich grassland** as part of the Bavarian Cultural Landscape Program (Kulturlandschaftsprogramm - KULAP)

The KULAP 2014-2020(22): A brief overview

1,193 Mio €
Budget

33
Different measures

4 priorities
Biodiversity + Soil and water + Climate + Cultural landscape

~ 50,000
Participating farmers

CASE STUDY: RESULT-BASED CONSERVATION OF SPECIES RICH GRASSLAND IN BAVARIA

Cattle grazing scheme

Low emission manure application

Flower strip scheme

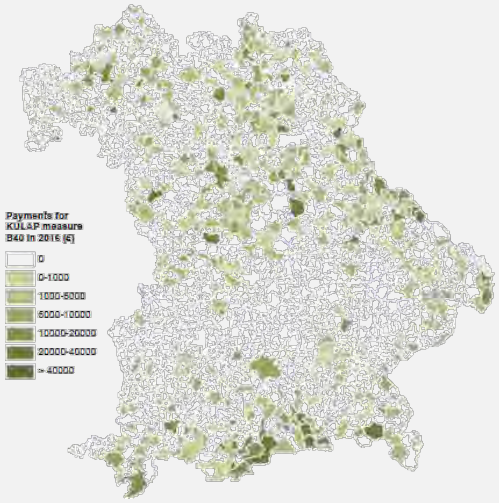
KULAP: Broad variety of options from animal welfare measures to landscape diversity measures

CASE STUDY: RESULT-BASED CONSERVATION OF SPECIES RICH GRASSLAND IN BAVARIA

Farmers receive **250 €/ha** if they can prove that at least 4 predefinded grassland species can be found on their fields.

Uptake rates are low (comparable action-based measure has **8,084** participating farmers).

2015	2016	2017	2018
894 participating farmers	858 participating farmers	845 participating farmers	897 participating farmers
1,389,514 € spent	1,306,596 € spent	1,268,601 € spent	1,351,581 € spent
		5,074 ha	5,406 ha



EMERGING QUESTIONS

Effectiveness of existing schemes
What do we know about the economic and ecological performance of action-based schemes?

Adoption of existing schemes
What are crucial factors when it comes to farmers‘ adoption of action-based schemes?

Effectiveness of result-based schemes
How do result-based schemes perform economically and ecologically compared to action-based schemes?

Adoption of result-based schemes
How do farmers perceive result-based agri-environment schemes?

EFFECTIVENESS OF EXISTING SCHEMES

Methods

- Data Envelopment Analysis with desirable technology and accompanying undesirable by-production technology to measure farm-level environmental/ecological and economic efficiency/productivity
- Ex-post quasi-experimental econometric treatment effect tools to measure scheme effects
- Spatial econometrics

Empirical cases

- Bavarian dairy farms surveyed between 2013 and 2018
- Dairy and crop farms from Germany, Italy, France, the Netherland surveyed between 2006 and 2011 (FADN)
- Municipality-level data on scheme participation and groundwater quality in Bavaria

Main results

(1) Agri-environment schemes do not alter farms' economic and environmental efficiency nor green productivity
(2) Eco-efficiency scores do not vary significantly between AES participants and non-participants, which questions the effectiveness of present AES
(3) AES focusing on crop production, organic farming, cultural land-scape do not improve groundwater quality

Papers

Ait Sidhoum, A., Canessa, C., Sauer, J. (2023). Effects of agri-environment schemes on farm-level eco-efficiency measures: Empir-ical evidence from EU countries. Journal of Agri-cultural Economics, 74(2), 551-569.

Ait Sidhoum, A., Mennig, P., Sauer, J. (2023). Do agri-environment measures help improve environmental and economic efficiency? Evidence from Bavarian dairy farmers. European Review of Agricultural Economics, 50(3), 918–953.

Tzemi, D., Mennig, P. (2022). Effect of agri-environment schemes (2007–2014) on groundwater quality; spatial analysis in Bavaria, Germany. Journal of Rural Studies, 91, 136-147.

Ait Sidhoum, A., Mennig, P., Frick, F. (2023). Assessing the Impact of Agri-Environmental Payments on Green Productivity in Germany. Under Review.

ADOPTION OF EXISTING SCHEMES

Method

- Systematic review of 20 years of ex-post empirical studies on AES adoption
- Different constructs, grouped into 'alignment', 'opportunity', 'engagement', and 'contracting' are considered to investigate how they influence farmer decisions

Cases

European agri-environment schemes

Main results

(1) Large contextual diversity in farmer decisions to participate
(2) Variables explaining the relevance of AES to farmers, the role of social contexts and satisfaction with contract design are the most significant ones
(3) Variables explaining the opportunity of participation are mostly ineffective in explaining uptake

Paper

Canessa, C., Ait Sidhoum, A., Wunder, S., Sauer, J. (2023). Understanding farmers' participation in European agri-environmental measures: a systematic review of the quantitative literature. Under Review.

EFFECTIVENESS OF RESULT-BASED SCHEMES

Methods

- Economic-ecological model to evaluate how efficient are farms participating in action and result-based schemes when marketable and non-marketable outputs are produced
- Data Envelopment Analysis to estimate farms' environmental efficiency in the production of marketable outputs and ecological services and to derive shadow prices of biodiversity

Empirical case

- Representative sample of Bavarian dairy farms managing a large share of permanent grassland in Bavaria (survey in 2022)
- Sample includes farms participating in result-based grassland conservation scheme, farms participating in action-based grassland conservation scheme and non-participating farms
- Farm-level biodiversity indicator based on grassland species found on fields

Main results

(1) Result-based schemes perform better than action-based schemes when it comes to the joint production of milk and biodiversity

(2) Opportunity costs of biodiversity provision with result-based schemes are higher compared to those of action-based schemes

Paper

Canessa, C., Raab, F. X., Mennig, P., Sauer, J. (2023). Opportunity costs of providing biodiversity in dairy farming: comparing result-based and action-based payments for grass-land conservation in Bavaria. Working paper.

ADOPTION OF RESULT-BASED SCHEMES

Methods

- Discrete Choice Experiment to investigate farmers' preferences for alternative grassland biodiversity payments
- Farm ecological performance is measured using a biodiversity index built based on grassland species found on fields

Empirical case

- Representative sample of Bavarian dairy farms managing a large share of permanent grassland in Bavaria (survey in 2022)
- Sample includes farms participating in result-based grassland conservation scheme, farms participating in action-based grassland conservation scheme and non-participating farms
- Farm-level biodiversity indicator based on grassland species found on fields

Main results

(1) Farmers are more reluctant to accept action-based schemes, however, the payment mechanism is not the only driver of farmers' decision-making
(2) Applicability of the prescribed management practice to the farming system, and the achievability of the outcome, are also key for adoption
(3) Intensive farmers are more likely to choose hybrid solutions than extensive farms, which prefer a result-based approach
(4) Farms with higher biodiversity tend to accept result-based schemes more frequently and are willing to enrol a greater share of their land

Paper

Canessa, C., Venus, T. E., Wiesmeier, M., Mennig, P., Sauer, J. (2023). Incentives, Rewards or Both in Pay-ments for Ecosystem Ser-vices: Drawing a Link Be-tween Farmers' Prefer-ences and Biodiversity Levels. Ecological Econom-ics. Forthcoming.

CONCLUSION

(1) Traditional **(action-based) schemes perform rather poorly concerning environmental benefits**; joint economic-ecological modelling leads to similar results

(2) Action-based schemes **do not encourage farmers to improve their environmental efficiency** nor do they improve green productivity

(3) Additionality of schemes is difficult to measure as many farms have a long history in participating in schemes and as **farm-level environmental data is difficult and costly to obtain**

(4) Action-based schemes remain popular; main criteria for farmers to participate are still the **possibility to easily integrate it into farm management** and detailed knowledge about the scheme

(5) While the theoretical advantages of result-based schemes are well-known by farmers, they are **not the only drivers behind joining or not**; hybrid schemes might be a solution

(6) Some evidence that result-based schemes perform better than action-based schemes when it comes to the joint production of marketed and non-marketed goods

Hybrid Agri-Environmental-Climate Schemes: Farmers' Preferences for Practices and Outcomes.

Final event EFFECT, 4th October 2023

Carolin Canessa

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Introduction

- Agri-Environmental-Climate Schemes (AECS) are voluntary payments made to farmers:
  - ❖ Implementing specific management practices (Action based)
  - ❖ Achieving predefined environmental outcomes (Result based)
- Ongoing discussion:

  Is it better to pay farmers for actions or results? Or both?

Conceptual framework

Result-based schemes more efficient than action-based ones with information assymetry (Gibbons et al. 2011; White and Hanley 2016).

Advantages

- Management flexibility.
- Land enrolled is additional.
- Production of environmental services integral part of farming.
- Link between payment and result.

Disadvantages

- Risk of non-achievement shifted from regulator to farmers.
- Increased monitoring and transaction costs.

↓

Drawbacks affecting adoption

Hybrid approaches to overcome these limitations

(Matzdorf et al. 2010; Burton and Schwarz 2013; Derissen and Quaas, 2013)

Research approach

Objective

Contribute to the discussion on whether is better to pay farmers for actions or results, or both (focus on participation).

Method

Used a Discrete Choice Experiment (DCE) in the case study of Bavaria (Germany) to:

- **Q1.** Investigate farmers' preferences for alternative contract designs (result, action, hybrid);
- **Q2.** Link preferences to farm structural and ecological characteristics.

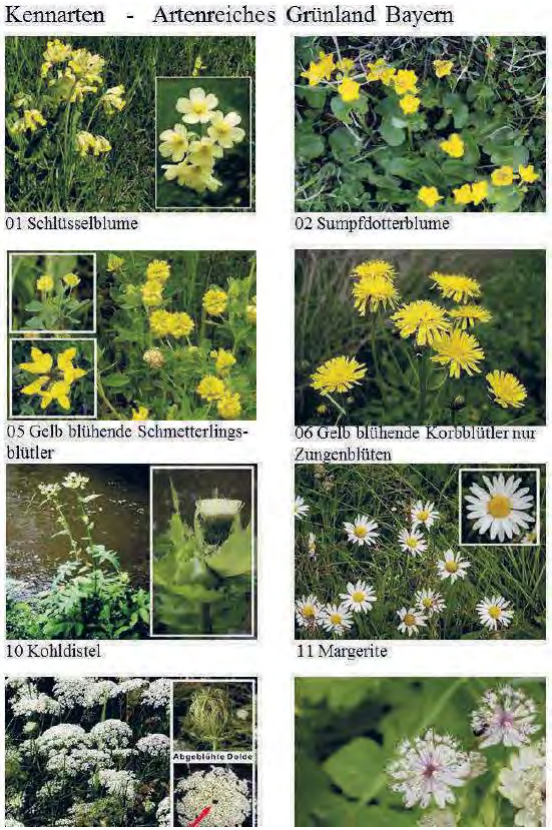
Methods

Case study

- Federal State of Bavarian (DE)
- Grassland: 35 % UAA
- Different approaches exist (KULAP 2015-2022) for grassland biodiversity:

  Action based measures - i.e.
  - Late mowing (Ban before 1° July)
  - Limit to livestock density (Max 1.4 LSU/ha)

  Result based measure
  - 4 flowering species out of a list of 34 species
  - Farmers do their own monitoring



Methods

Experimental design

Attribute selection based on:

- KULAP offer
- Q-methodology

Contract attributes	Attributes levels
Practice	Late mowing (1.07) Maximum LSU (1.4 LSU/ha) None
Baseline payment (€/ha)	0€, 100€, 200€, 250€
Ecological result	0, 2, 4 or 6 indicator species
Ecological payment(€/ha)	0€, 100€, 200€, 300€
Monitoring	Farmer Authority

Combination of attibutes determines the approach:

- Action (ABS)
- Result (RBS)
- Hybrid (HBS)

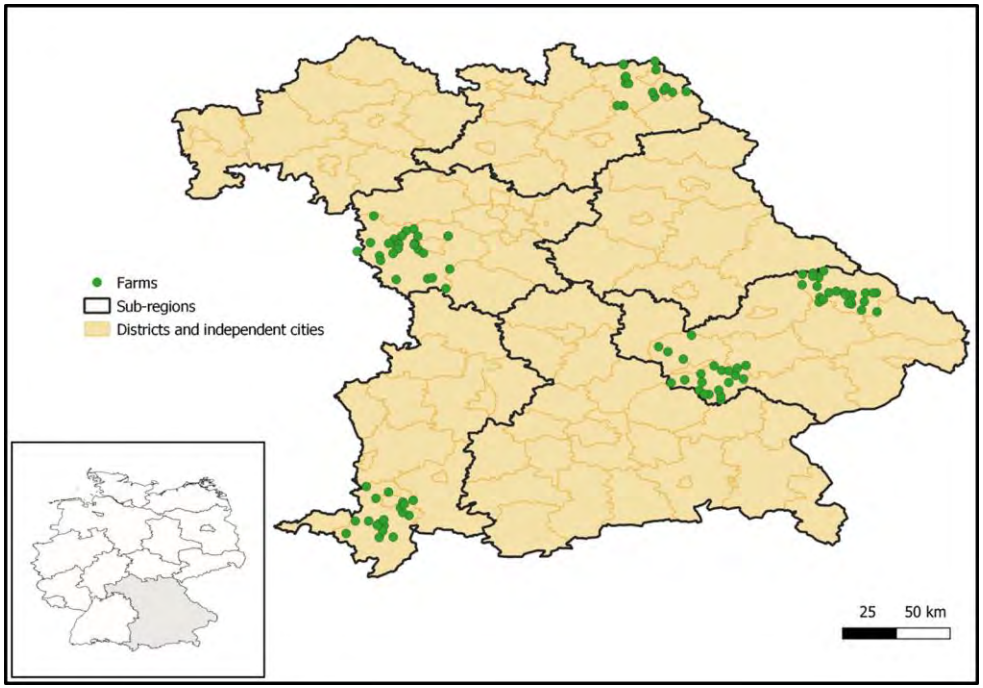
ID. Block.Card.	Measure 1	Measure 2	None
What are you rewarded for?			
Pre-defined sustainable practice	Late mowing (01.07)	-	
Basic payment	100 €	-	
Ecological result	2 Species	4 Species	
Ecological payment	100 €	300 €	
Who does the monitoring of compliance?			
Monitoring	Farmer	Authority	
In which measure would you participate and how many hectares would you enroll?	❑ ..... ha	❑ ..... ha	❑

Methods

Data collection

- In person data collection.
- Sample of 107 grassland farms.
- Farm structural data
- Farm ecological data
  - Species richness recorded plot level.
  - Farm level biodiversity index:

$$Biodiversity\ Index_i = \frac{\Sigma_{j=1}^{4} n_{ij} * area_{ij}}{grassland\ area_i}$$



Methods

Analytical framework

Three steps approach:

1. Mixed **logit** (Train, 2009): to estimate probability of a farmer adopting the scheme as a function of the contract attributes, scheme approach and ecological status of farms.

2. Latent class (Boxall and Adamowicz, 2002): to estimate how the probability of uptaking the schemes vary among groups of farmers with different farm structures.

3. Land allocation analysis (Kuhfuss et al., 2016): to estimate the effect of attributes and ecological status on land allocation decisions.

Results
Mixed logit

Parameters	MXL 1 (Baseline)				MXL 2 (With Biodiversity Index)			
	Mean		SD		Mean		SD	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Total payment	0.005***	0.524	1.399***	0.407	0.005***	0.519	1.416***	0.379
Late mowing (base: none)	-2.148***	0.390	1.197***	0.415	-2.241***	0.406	1.261***	0.457
Maximum LSU (base: none)	-0.826***	0.313	1.468***	0.297	-0.919***	0.310	1.275***	0.291
Indicator species	-0.459 ***	0.077	0.240***	0.066	-0.461***	0.078	0.220***	0.070
Monitoring (base: authority)	0.702***	0.171	0.304	0.491	0.713***	0.178	0.333	0.401
ASC: Result-based (RBS)[a]	0.865**	0.375	0.938***	0.384	0.421	0.423	1.000***	0.373
ASC: Hybrid-based (HBS)[a]	0.859**	0.402	1.019***	0.407	0.759*	0.451	0.936*	0.447
RBS*Biodiversity Index					0.222*	0.127	0.040	0.188
HBS*Biodiversity Index					0.106	0.139	0.036	0.157
Log likelihood	-565.126				-530.516			
AIC	1158.252				1097.032			
BIC	1236.136				1196.131			
N. obs.	1926				1818			
N. farmers	107				101			

[a] The alternative specific constants were coded as the result based (RBS) and hybrid based (ABS) option respectively.

Note: *, **, *** represent significance level at 10, 5, and 1 percent, respectively. Observations refer to the number of total alternatives faced by farmers; which are then grouped by choice occasion. The number of total choice cards answered by participants was 642. The number of observations is lower in MXL 2, because of 6 some missing values for the biodiversity index.

Results

Latent class

Intensive Extensive

	Class I		Class II	
	Coef.	**Std. Err.**	**Coef.**	**Std. Err.**
Total payment	0.0001	0.0009	0.008***	0.001
Late mowing (base: none)	-1.774***	0.349	-0.041	0.686
Maximum LSU (base: none)	-1.131***	0.338	1.623**	0.655
Indicator species	-0.234***	0.059	-0.334***	0.090
Monitoring (base: authority)	0.821***	0.171	-0.096	0.223
ASC: Result-based (RBS)	0.293	0.385	1.393**	0.679
ASC: Hybrid-based (HBS)	0.891**	0.370	-0.416	0.758
Class share	(0.67)		(0.33)	
Membership variables				
Full time	1.291*	0.728		
Participation AECS	-2.076**	0.894		
Dairy farms	1.646**	0.785		
Milk cows	-0.0009	0.008		
Constant	0.579	0.862		
Log-likelihood	-552.029			
N. obs.	1926			
Farmers	107			

Results

Land allocation decision

Dependent: % of grassland allocated	Coefficient	Std. error
Total payment	0.0008***	0.0002
Late mowing	-0.317***	0.052
Indicator species	-0.0008	0.016
Monitoring	-0.167***	0.042
Result-based (RBS)	-0.282***	0.093
Hybrid-based (HBS)	-0.056	0.082
Biodiversity index (BI)	0.050***	0.010
m1	-0.144**	0.075
m2	-0.216***	0.083
m3	-0.635***	0.166
Intercept	-1.374***	0.487
N. obs.	386	

Note: observations refer to the alternatives chosen by farmers, other than the status quo, for which they provided the information on the land to enrol.

Discussion & Conclusions

Q.	Findings	Implications
1.	❖ No clear preference for any approach. ❖ Overall rejection action-based schemes. ❖ Payment mechanism is not the only driver of farmers' choices. ❖ Applicability of practices, achievability of outcomes, and farm structure better explain preferences. ❖ Some practices make farming impossible.	❖ Targeting farmers and tailor payments based on scheme's primary objectives. ❖ Offer both type of schemes: • HBS to induce extensification by intensive farms. • RBS to induce maintainance by extensive farms.

Discussion & Conclusions

Q.	Findings	Implications
2.	❖ Farms with higher biodiversity tend to accept RBS more frequently, and are willing to enrol a greater share of their land.	❖ Need to consider a potential lack of additionality: • Baseline measures for schemes aiming at modifying practices. • No need of baseline measures for schemes aiming at maintaining practices.
	❖ Awareness about farms' ecological potential influences uptake of RBS.	❖ On-site technical advice to help farmers assessing their plots' ecological potential.

- Need for replication studies for external validity.

Thank You

For Your Attention

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For further information:
Canessa, C.; Venus, T. E.; Wiesmeier, M.; Mennig, P.; Sauer, J. (2023): Incentives, rewards or both in payments for ecosystem services: Drawing a link between farmers' preferences and biodiversity levels. In Ecological Economics, 213, 107954. DOI: 10.1016/j.ecolecon.2023.107954

Appendix References

Boxall, Peter C.; Adamowicz, Wiktor L. (2002): Understanding Heterogeneous Preferences in Random Utility Models: A Latent Class Approach. In Environ Resource Econ 23 (4), pp. 421–446.

Burton, Rob J.F.; Schwarz, G. (2013): Result-oriented agri-environmental schemes in Europe and their potential for promoting behavioural change. In Land Use Policy 30 (1), pp. 628– 641.

Derissen, Sandra; Quaas, Martin F. (2013): Combining performance-based and action-based payments to provide environmental goods under uncertainty. In Ecological Economics 85, pp. 77–84.

Gibbons, James M.; Nicholson, Emily; Milner-Gulland, E. J.; Jones, Julia P. G. (2011): Should payments for biodiversity conservation be based on action or results? In Journal of Applied Ecology 48 (5), pp. 1218–1226.

Kuhfuss, Laure; Préget, Raphaële; Thoyer, Sophie; Hanley, Nick (2016): Nudging farmers to enrol land into agri-environmental schemes: the role of a collective bonus. In European Review of Agricultural Economics 43 (4), pp. 609–636.

Matzdorf, Bettina; Lorenz, Jana (2010): How cost-effective are result-oriented agrienvironmental measures?—An empirical analysis in Germany. In Land Use Policy 27 (2), pp. 535–544.

Train, Kenneth E. (2009): Discrete Choice Methods with Simulation. 2nd ed. Cambridge: Cambridge University Press

White, Ben; Hanley, Nick (2016): Should We Pay for Ecosystem Service Outputs, Inputs or Both? In Environ Resource Econ 63 (4), pp. 765–787.

Rewarding landowners for biodiversity improvements: payments for actions or payments for outcomes?

Katherine Simpson[1], Mary Nthambi[1] Frans P. de Vries[2], Paul R. Armsworth[3], Martin Dallimer[4], and Nick Hanley [1]
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What to pay for?

- Majority of AES currently focus on payment for **actions** e.g., reduced fertilizer use, lower stocking rate.

- AES which pay for environmental **results** are being increasingly discussed in the academic literature and policy circles in Europe and the UK

Payment for Results

Value of the payment directly linked to the level of environmental outcomes achieved, not to the management inputs/actions undertaken

Theoretically preferable for a number of reasons:

- Farmers can use private information to determine how best to produce these outcomes
- Provide incentives to farmers to enrol their most suitable land and reduces adverse selection (White and Hanley 2016)
- By being less prescriptive and by rewarding inventiveness, they may increase farmer engagement and lead to an internalization of the scheme's goals by farmers (Burton and Schwarz, 2013).

Why, then, are result-based schemes not more prevalent?

Payment for Results

Why then are result-based schemes not more prevalent?

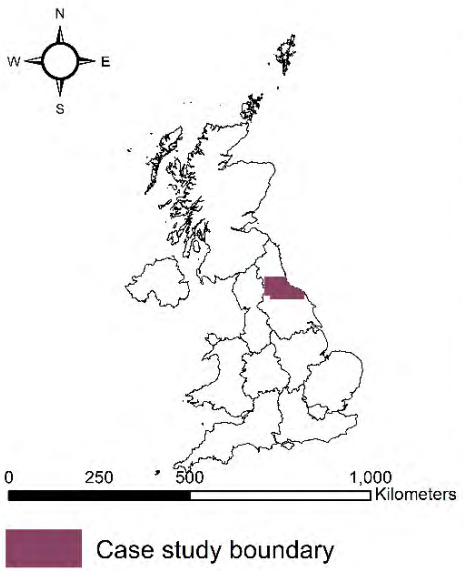
- Less attractive to farmers due to the associated **uncertainty of payment**, as performance also depends on external environmental effects (for example the weather; the behaviour of neighbours; migration patterns)
- Can require sophisticated monitoring and measurement of results

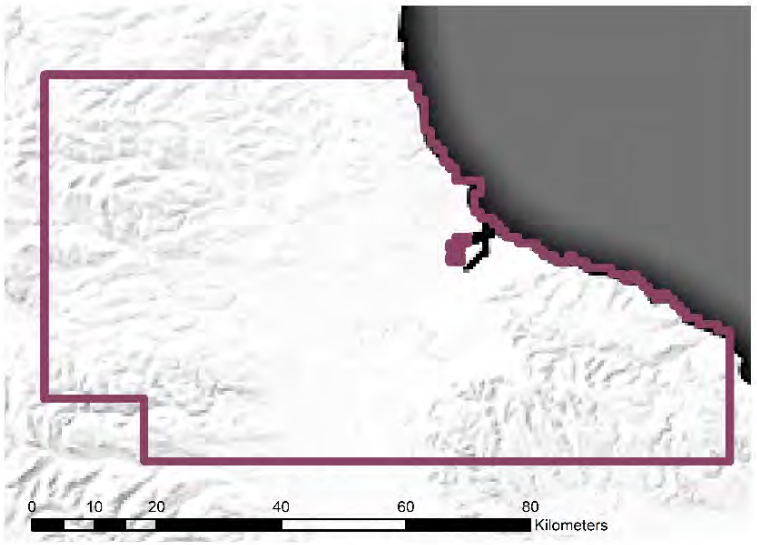
Schemes have only been applied in contexts where monitoring costs and payment uncertainty are acceptably low

PAYMENT FOR *MODELLED* RESULTS

- Suggested in paper by Bartkowski et al (2021)
- Farmers enter into a contract where their payments depend on the predicted results of their actions on some indicator (eg species presence versus absence; water quality change)
- These predictions come from a statistical model relating actions to outcomes
- Advantages to the farmer: no uncertainty over the payment (compared to payment for actual results)
- Advantages to the government: differentiates payment rates according to spatially-varying ecological benefit; lower monitoring costs than pure payment-for-results.

Case study: Lapwing Conservation in the Tees Valley & Pennine Uplands





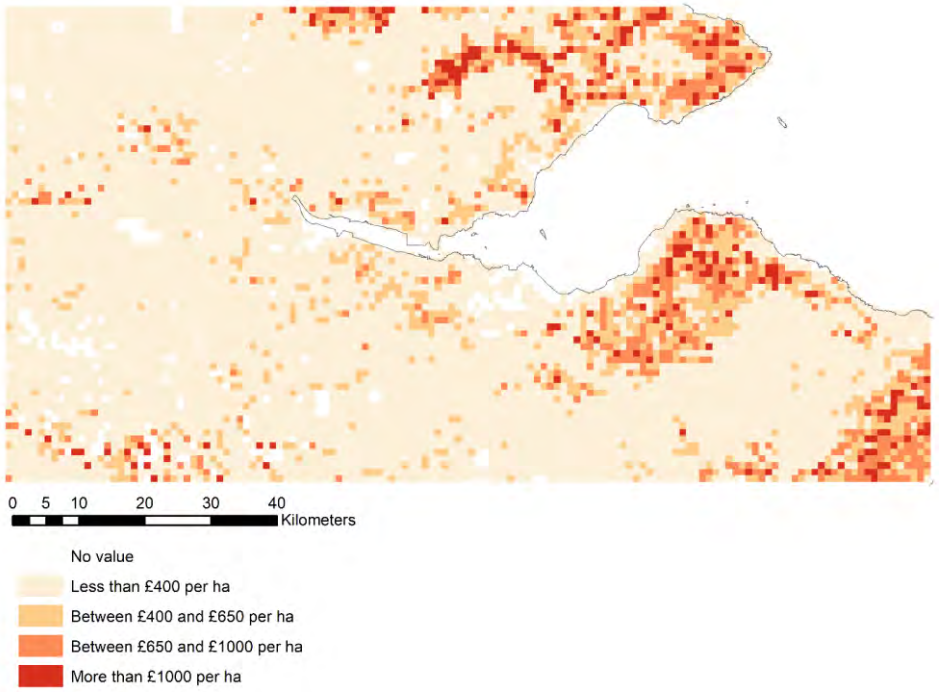
EFFECT

THEORETICAL FRAMEWORK

Economic decisions modelled based on the economic rent (profit) generated by each land parcel

- For a farmer to switch from ag. production to conservation, **farmer must be offered a subsidy payment equal at minimum to the agricultural rent forgone**
- Gross margin (rent) of ag. parcels calculated by combining crop coverage & livestock stocking rates with the associated gross margin data
- We expect agricultural rents to vary across the landscape (soil quality, altitude, rainfall patterns)

Ecological outcomes based on species responses to change in agricultural land management practices



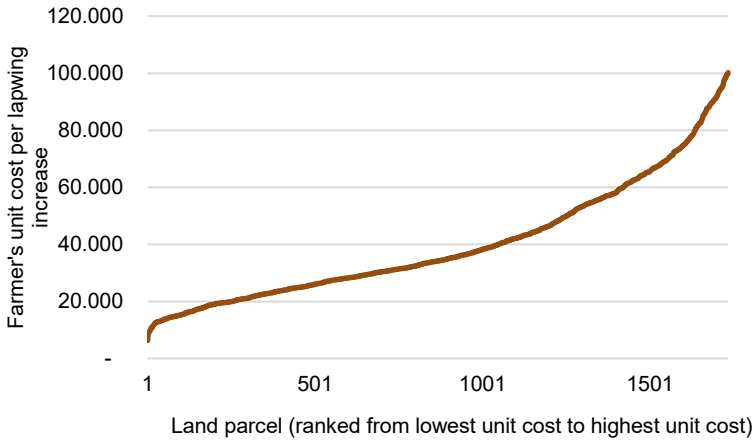
POLICY SIMULATION

Payment for actions: no spatial targetting

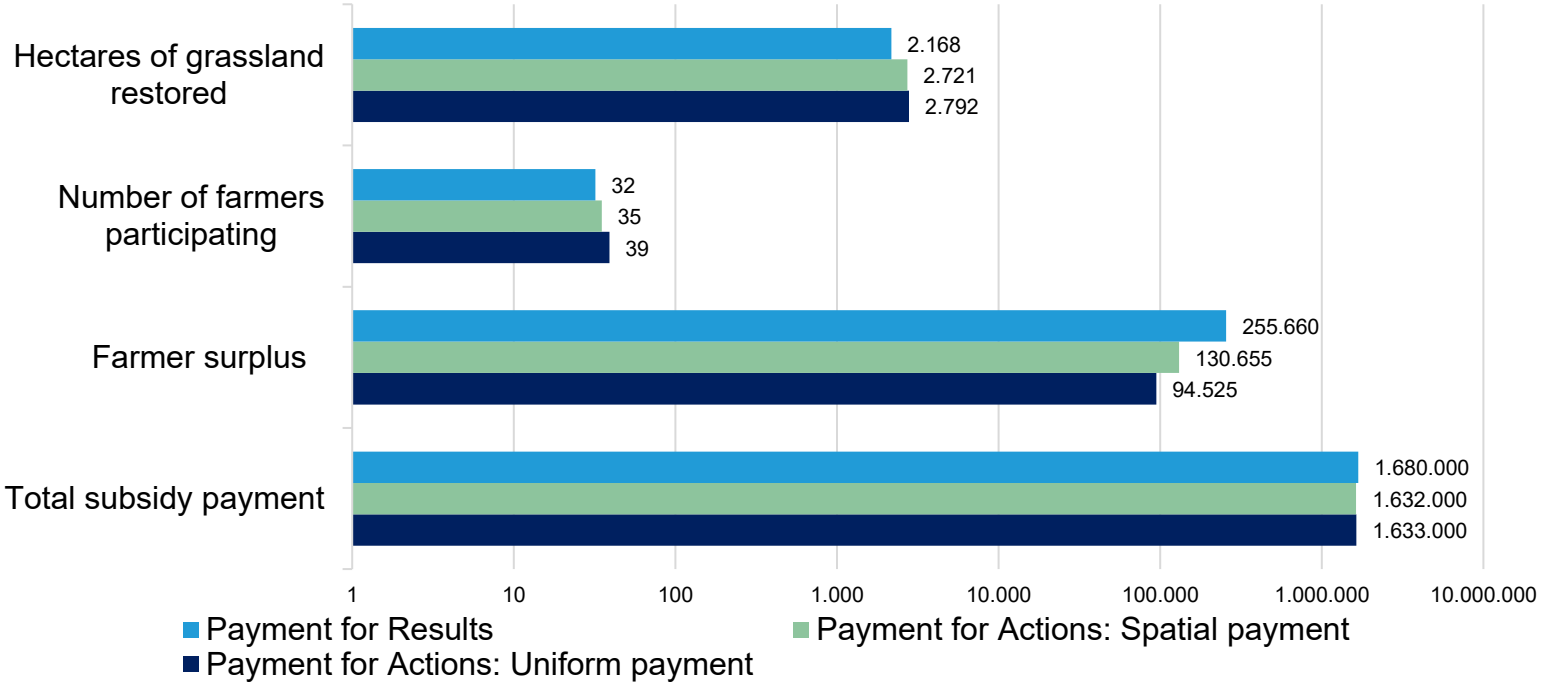
- Farmers are paid to undertake actions to restore low intensity grassland (Equivalent to the dominant type of contract under Pillar 2 of the CAP)
- Subsidy paid to farmers based on the average opportunity cost per ha of restoring agricultural land to low-intensity grassland across the catchment
- Uniform payment rate: £585 per hectare (all farmers are offered this amount)
- Total subsidy: £1.6 million

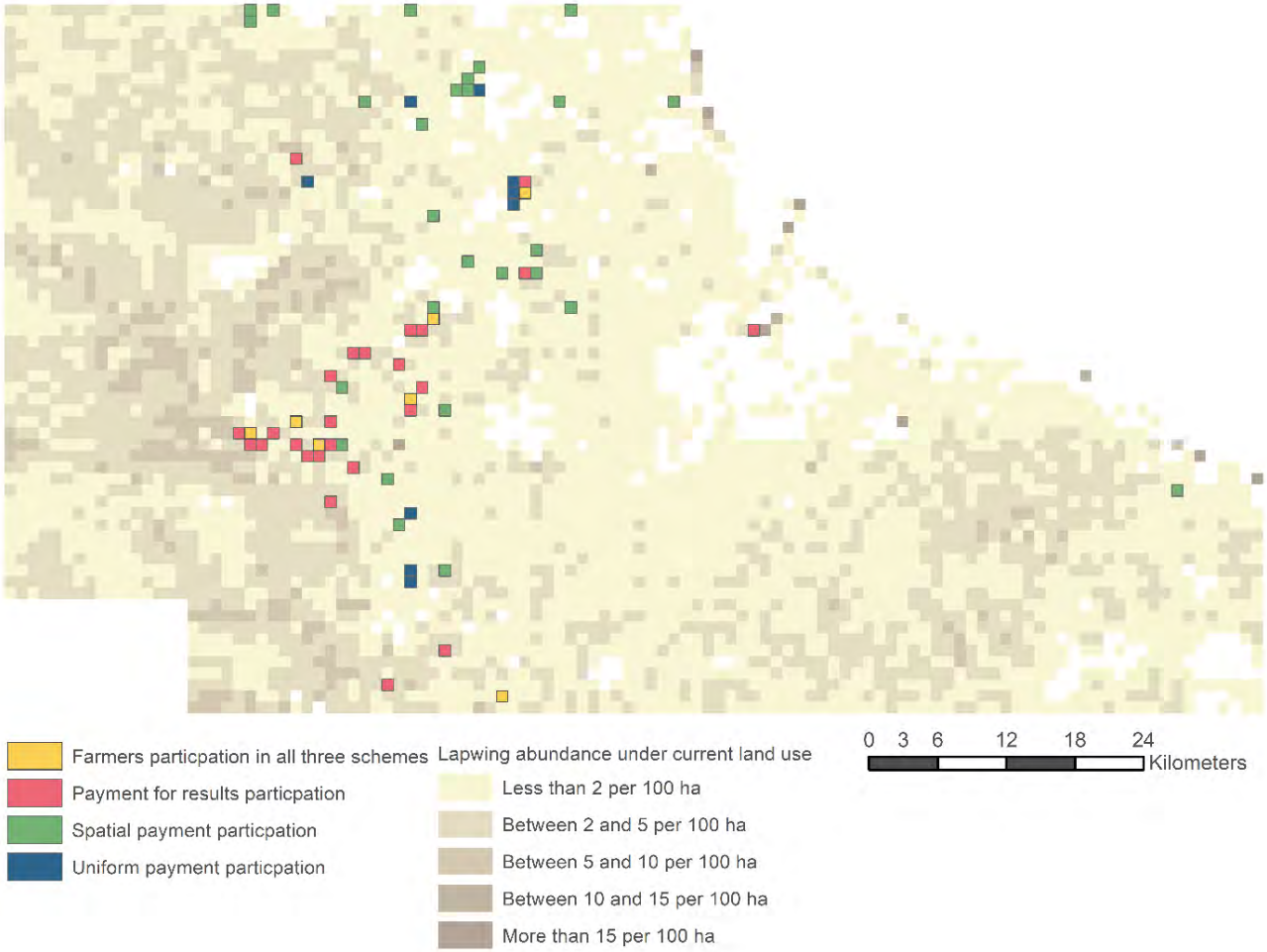
Payment for modelled results

- Payment per predicted increase in lapwing for an agricultural land parcel restored to low-intensity grassland.
- Derive a farmer's opportunity cost for increasing the abundance of a single lapwing
- Opportunity cost varied from £6,300 up to £100,300
- Total subsidy: £1.6 million (same as payment for actions policy)
- Payment rate of £12,800 per lapwing

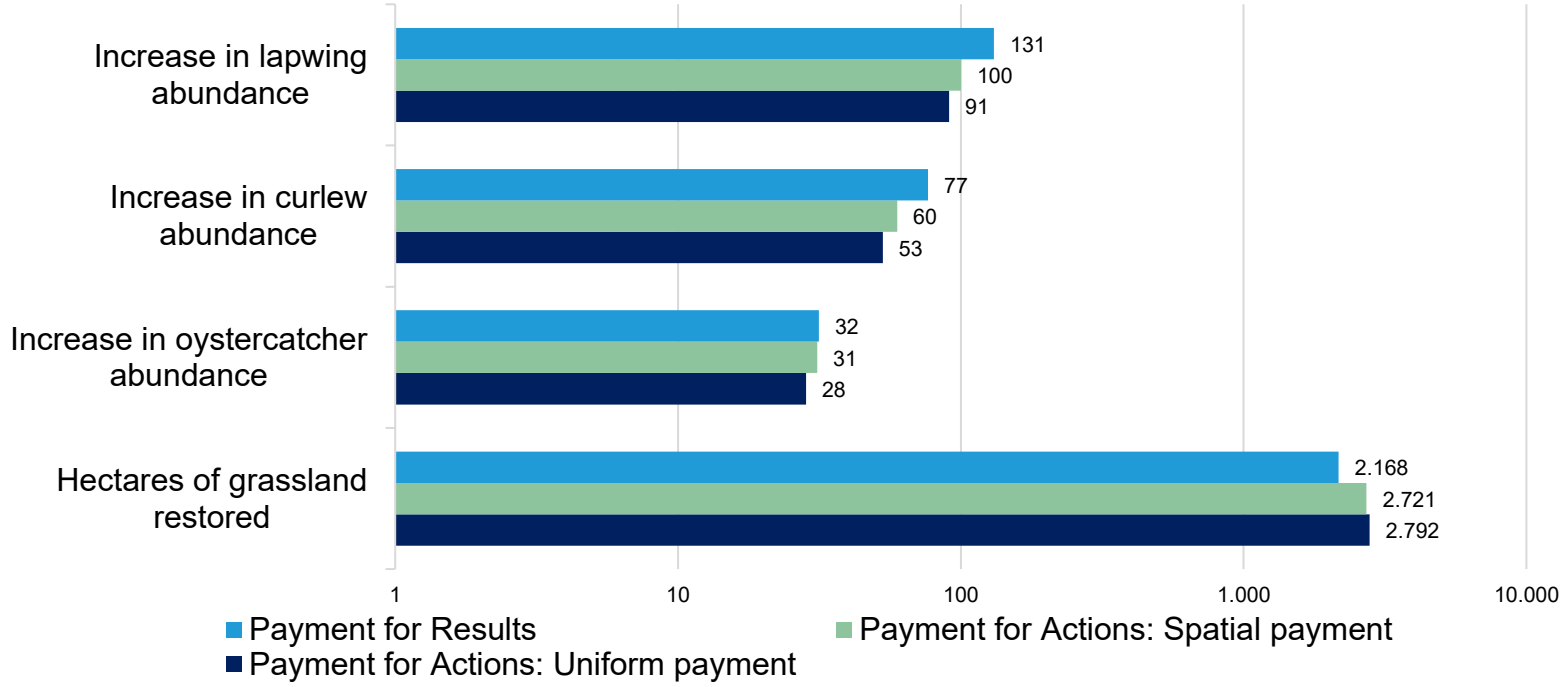


FINDING 1: PARTICIPATION AND COST




Farmers particpation in all three schemes
Payment for results particpation
Spatial payment particpation
Uniform payment particpation
Lapwing abundance under current land use
Less than 2 per 100 ha
Between 2 and 5 per 100 ha
Between 5 and 10 per 100 ha
Between 10 and 15 per 100 ha
More than 15 per 100 ha
0 3 6 12 18 24
Kilometers

FINDING 2: ECOLOGICAL OUTCOMES



EFFECT

Discussion

- Take home message 1: payment by modelled results appears to be cost effective for this case study region
- Greater ecological gains for target species (lapwing) as well as for 2 off-target species (curlew and oystercatcher), even though smaller area of restored grassland is created

Limitations

- Payment for modelled results does not encourage farmers to use their own knowledge on how best to produce the desired environmental outcome.
- Species abundance model does not take into account temporal dynamics; there no time lags between the restoration of grassland and increased species abundance in our model.

Any questions?

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817903.

EFFECT

EFFECT

COMBINING CARROTS AND STICKS TO DESIGN MORE EFFECTIVE SCHEMES

Mette Termansen, Kahsay H. Zemo, Raphael Fillippelli, Goytom A. Kahsay,
Abrha T. Abay, Carsten Daugbjerg & Bo J. Thorsen, University of Copenhagen, Denmark

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817903.

TAKE HOME MESSAGE

1. Fixed-rate payments for environmental services in agricultural landscapes have not achieved the environmental targets for the EU and its member states
2. Uniform regulation through standards are costly due to the huge environmental & economic heterogeneity of agricultural landscapes
3. Combining strict enforceable collective caps on environmental damage while giving agency to farmers to find local solutions is feasible
4. Coordination mechanisms among farmers and between environmental agencies and farmers should be carefully developed to avoid counter productive outcomes

THE CASE:

THE DANISH TARGETED NITROGEN REGULATION: EVOLUTION, EVALUATION AND FUTURE PATHS

A BRIEF HISTORY: DANISH NITROGEN REGULATION

Eutrophication emerges as a political issue in the 1980s

– initiate conflicts over agricultural and environmental priorities.

1993 agreement on the Action Plan for Sustainable Farming

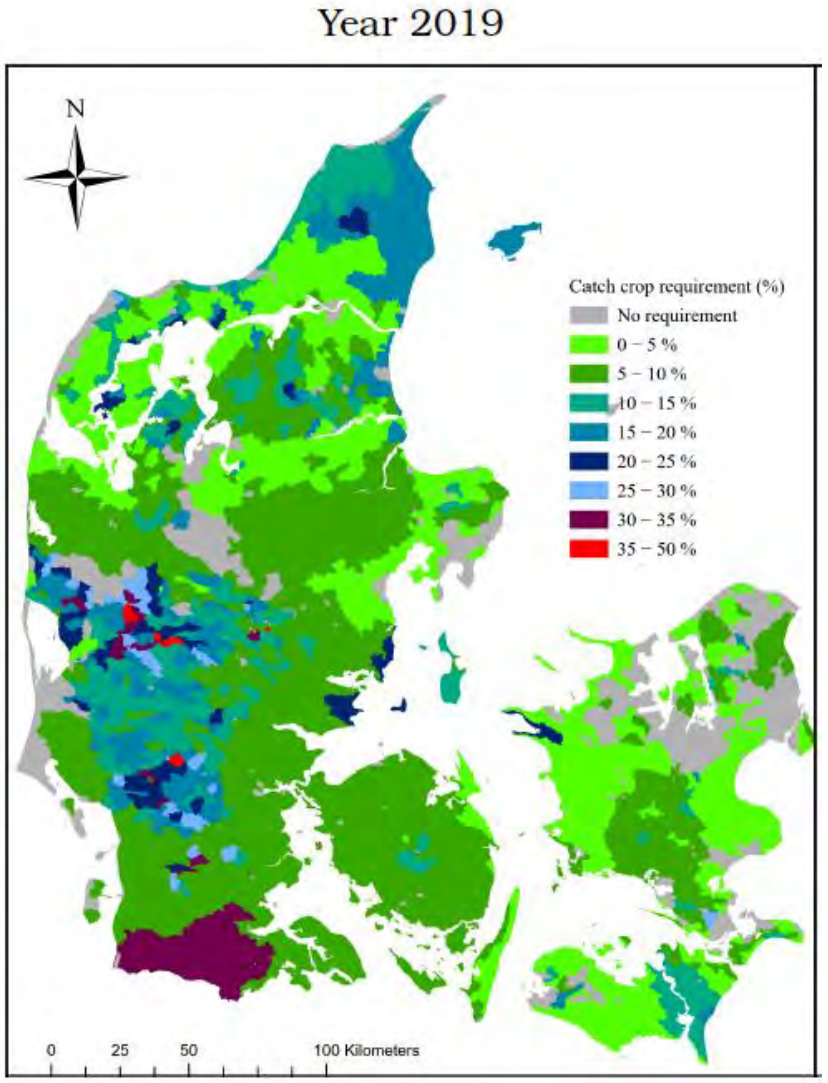
- introduces uniform nitrogen application **standards**

Growing opposition from the sector and rising compliance costs

- Evolution to the 2015 Agricultural Accord
- A paradigm shift towards environmentally targeted regulation & from polluter pays towards beneficiaries pay

INNOVATION IN THE TARGETED NITROGEN REGULATION

- Incorporation of ecological and hydrolog
  scheme design to allow environmental ta
- Replace N-input standards with compens
  nutrient retention (with some flexibility t
- Inclusion of a cap on total emissions to c
  design.
- If **voluntary** commitments are insufficie
  environmental targets, mandatory uncon
  (**standard**).



EFFE

EMERGING QUESTIONS:

1. Are the N-catch crop measure (and the other eligible agri-environmental practices) cost-effective in meeting N-reduction targets ?

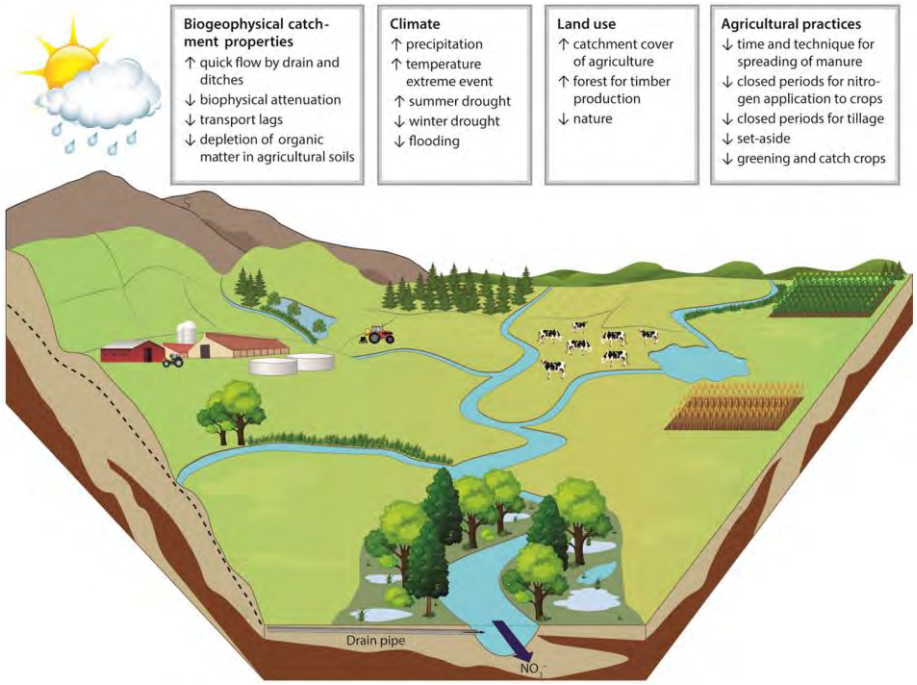
2. Has the targeted scheme been effective ? What is the evidence ?

3. Does the scheme encourage effective coordination between farmers in the catchments ?

4. Can the coordination mechanisms be improved ?

RQ1: WHAT ARE THE COST-EFFECTIVE MEASURES TO REACH WATER QUALITY TARGETS

Used integrated spatially explicit ecological-economic modelling (*TargetEconN*) to generate a baseline for analysis of voluntary AES interventions. Compared input standards, targeted regulation practices, land-use change interventions, interventions in the sink (wetlands & marine measures).



Result: Cost-minimisation scenario for 108 catchments to achieve total reduction of 13,075 ton

Measure	Reduced N (ton)	%
N Input reduction	91	0.7%
Catch-crops & other eligible measures	434	3.3%
Land use change interventions (Pillar II)	12,486	96%

Filippelli et al. (2023). Integrated environmental-economic modelling for cross sectoral water policy evaluation (Under review)

Illustration from Petersen et al. (2021). Science of the total environment (787).

RQ2: HAS THE TARGETED SCHEME BEEN EFFECTIVE ? WHAT IS THE EVIDENCE ?

Ex-post impact evaluation:

We used nine years of agricultural account statistics data.

Focused on the program's impact on farm level purchased nitrogen and crop revenue.

We used Two-Way Fixed Effects (TWFE) regressions with sufficient controls to account for self-selection bias

Results (preliminary):

Program participation has had a minimal impact on nitrogen purchases

The effort has not been allocated to the most effective locations
(not achieved within catchment targeting)

…but has led to a small (but significant) reduction in farm crop revenues

Strengths: Based on real decisions, in real landscapes, by real farmers

Limitations: Data does not allow robust assessment of water quality outcomes
& we are not able to test alternative scheme design

RQ3: DOES THE SCHEME ENCOURAGE EFFECTIVE COORDINATION BETWEEN FARMERS IN THE CATCHMENTS ?
RQ4: CAN THE COORDINATION MECHANISMS BE IMPROVED ?

Focus on *internal coordination mechanisms:*

Coordination of nitrogen mitigation effort between farmers in response to collective scheme design

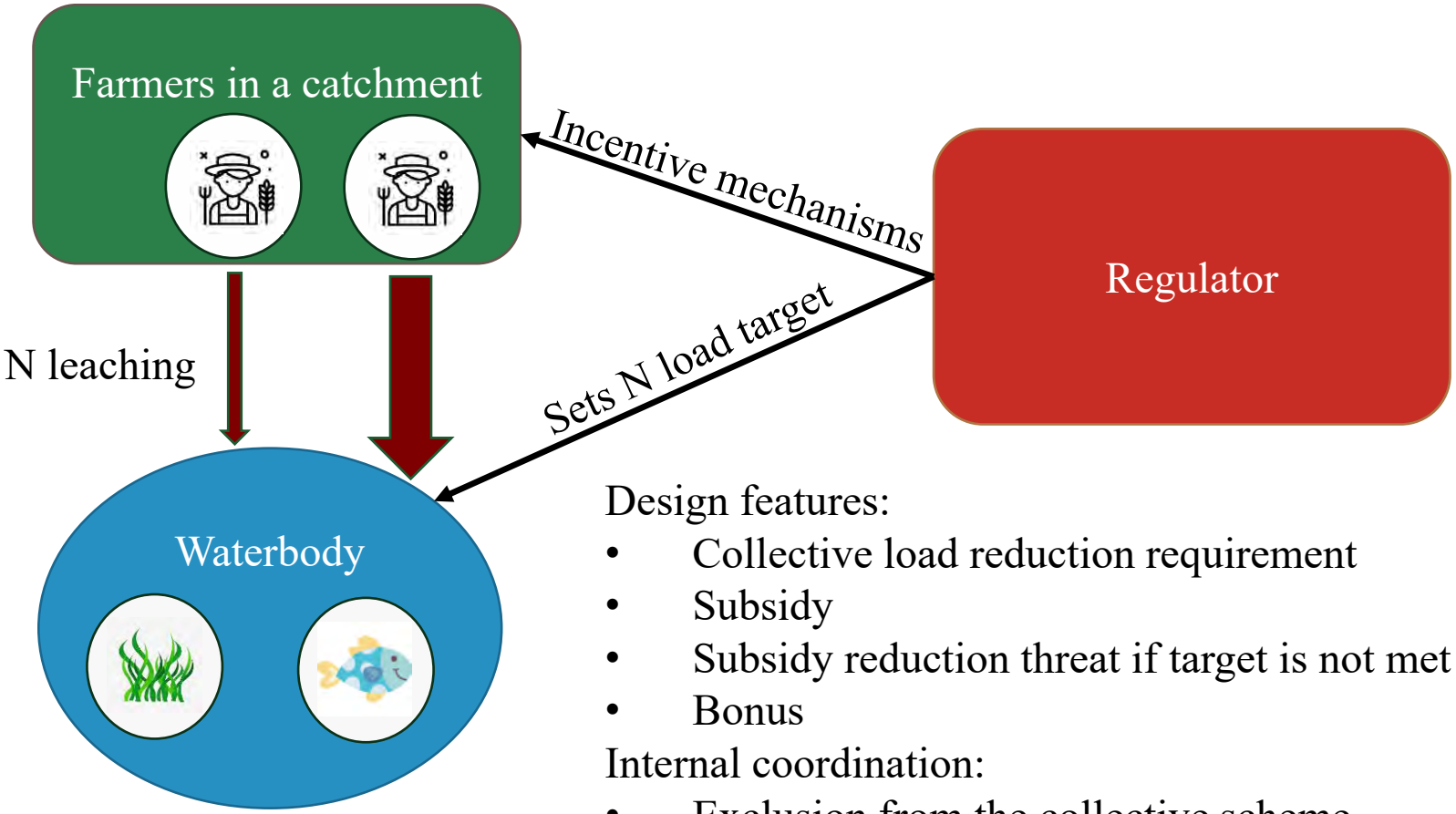
Success indicators of a collective scheme:

Environmental effectiveness,
Social Welfare and Equity

Use experiments to conduct an ex-ante evaluation of alternative *collective scheme designs:*

EXPERIMENTAL SET-UP

Mimic the features in the Danish Targeted Nitrogen Regulation



Design features:

- Collective load reduction requirement
- Subsidy
- Subsidy reduction threat if target is not met
- Bonus

Internal coordination:

- Exclusion from the collective scheme
- Transfer of subsidy between farmers to encourage mitigation effort from environmentally effective areas

EXPERIMENTAL IMPLEMENTATION

We conducted a **framed 'field' experiment** in **agricultural schools**

Participants: 186 next-generation farmers

- Production managers
- Agricultural production economist

Web based interactive experiment

Participants use their own computer

EXPERIMENTAL FINDINGS

- Our findings suggest a potential for collective agri-environmental approaches combining carrots (voluntary including a subsidy) and stick (mandatory element to achieve the required reduction)
- Collective designs do achieve the required voluntary participation (i.e. incentivize the requited effort to meet the target).
- However, our findings suggest that the internal enforcement mechanisms can have adverse effects
    - Participants do not transfer sufficient subsidy to make them environmentally effective (the effective farmers are not encouraged enough)
    - Participant are too keen to exclude group members (underperforming farmers are punished too much) – undermines social welfare and equity outcomes

CONCLUSIONS

- The case study shows that the evolution of the Danish nitrogen regulation has been shaped over time by negative and positive feedbacks between different stakeholders (farmer unions, environmental interest groups and government agencies).
- A successful scheme is likely to require higher flexibility and include more effective measures (i.e. catch-crops and the current eligible measures are not sufficiently effective). Need to include land-use change and sink measures such as restoration of wetlands.
- Allocation of effort to produce local public good may be improved using hybrids of top-down and bottom-up models.
- Caution is needed regarding the use of internal enforcement mechanisms.
- More ex-post evaluation of AES is necessary to evaluate whether AES goals actually live up to their intended goals.
- A mix of methods (experiments and modelling) can support development of new AES in collaboration with farmers, farm advisors and programme developers.

ACKNOWLEDGEMENTS

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Hans E. Andersen,

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Griffith School of Water Resources, Brisbane, Australia

NOVEL DESIGN MECHANISMS TO INCREASE THE EFFECTIVENESS OF AGRI-ENVIRONMENTAL SCHEMES

Uwe Latacz-Lohmann and Chi Nguyen
Kiel University, Germany

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817903.

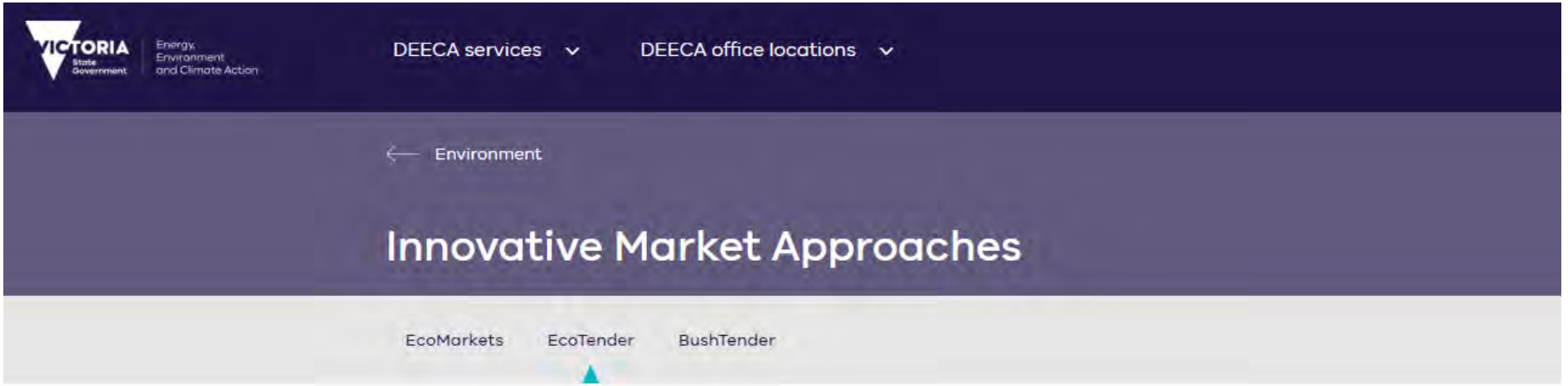
NOVEL DESIGN MECHANISMS - OVERVIEW

1. Collectively organized nature conservation (Netherlands)
2. Payment by results: rewarding farmers for conservation outcomes rather than activities
3. Conservation auctions: allocate contracts through competitive bidding
4. Spatial coordination of conservation activities
5. Social norms interventions: Securing environmental gains in the long run

NOVEL DESIGN MECHANISMS - OVERVIEW

1. Collectively organized nature conservation (Netherlands)
2. Payment by results: rewarding farmers for conservation outcomes rather than activities
3. **Conservation auctions: allocate contracts through competitive bidding**
4. **Spatial coordination of conservation activities**
5. Social norms interventions: Securing environmental gains in the long run

CONSERVATION AUCTIONS



EcoTender

EcoTender was a conservation auction process that compared the value of management actions across different sites for water quality, erosion, carbon and native vegetation improvements.

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WHY AUCTIONS?

1. Cost revelation: bidders reveal their costs with the bids
2. Price discovery: harness information held privately by bidders in determining prices for public goods
3. Cost-effectiveness: more environmental benefit for the €
4. Auctions as a ‘market‘ for public goods
5. Fairness: tendering is perceived to be fair

AUCTIONS VS. FIXED PAYMENTS: HOW MUCH BETTER?

- Auction experiment Kiel/Perth: Cost savings 30 to 60%, quickly eroding with repetition
- Bidder learning poses a substantial threat to the functioning of multiple-round conservation auctions
- Challenge Fund (Forestry Commission, Scotland): 33 to 36% efficiency gains, at an estimated 20% additional FC staff time
- In EU: preference for cooperative approaches, equal treatment mentality

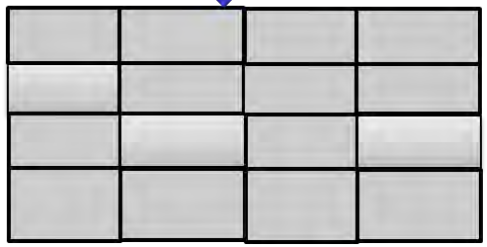
SPATIAL COORDINATION

Where spatial coordination can improve environmental outcomes:

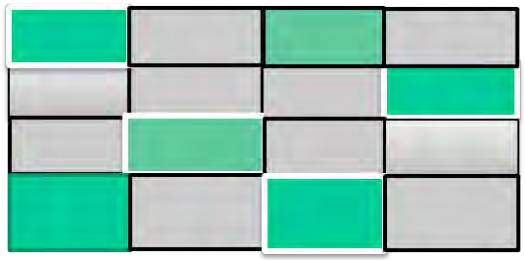
- Corridors for wildlife migration
- Minimum viable habitat size
- Creation of options for re-colonisation
- Creation of flood retention areas or moorland conservation

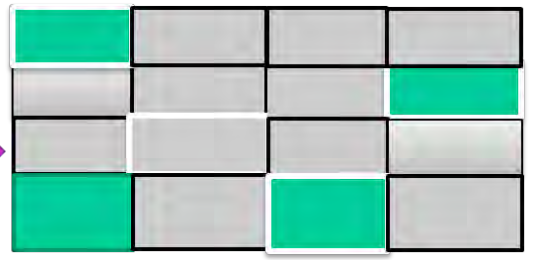
EFFECT: SPATIAL COORDINATION & AUCTIONS

Conservation auctions



Fragmented conserved habitats

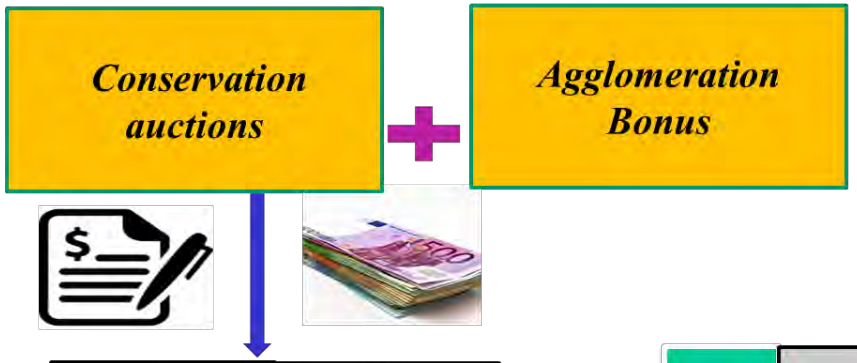




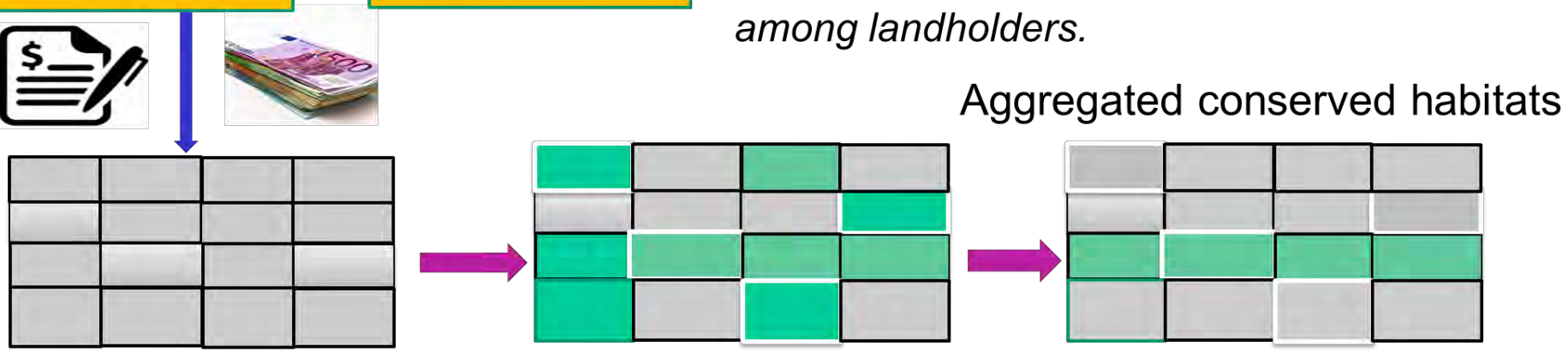
Spatial configuration of **offered** parcels

Spatial configuration of **selected** parcels

SPATIAL COORDINATION & AUCTIONS



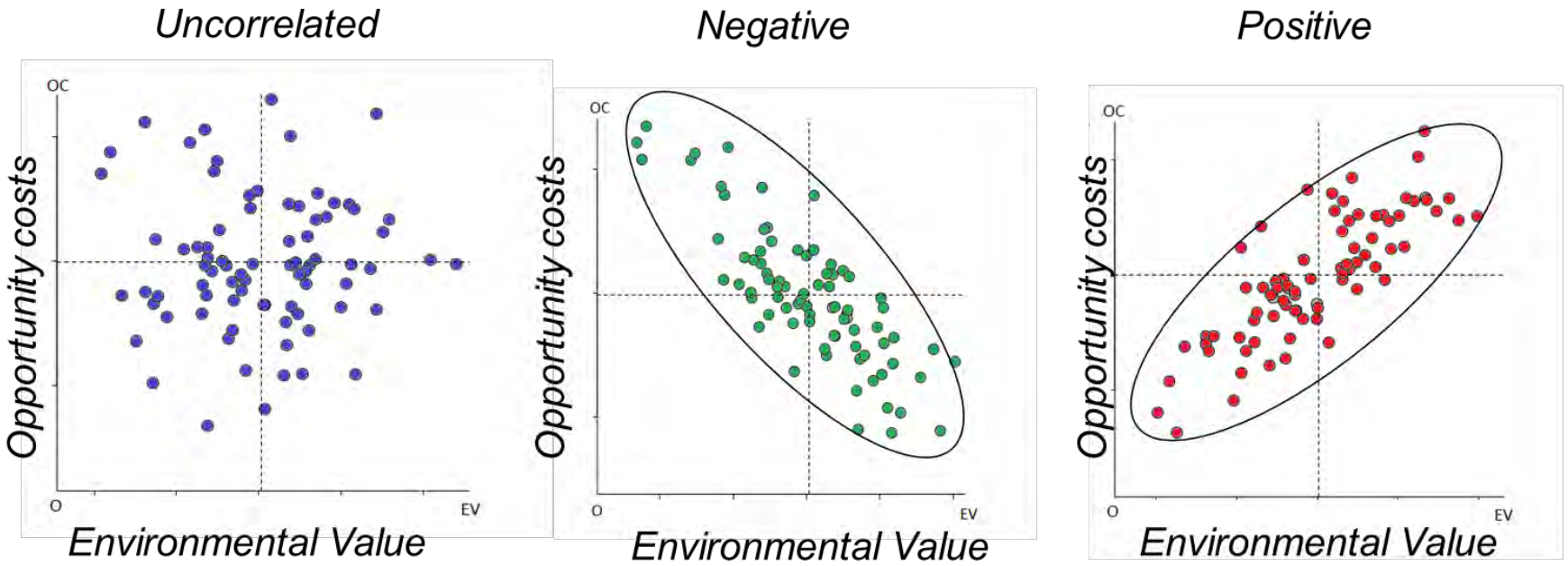
Agglomeration Bonus *is a payment explicitly designed to reward spatial coordination of conservation efforts among landholders.*



SPATIAL COORDINATION & AUCTIONS

Investigate the effectiveness of ***agglomeration bonus***

in different landscape configurations



SPATIAL COORDINATION & AUCTIONS

- Online lab experiments via Z-tree Unleashed
- 180 students at Kiel University, Germany

Experimental Design

Treatments (Between-subject design)	Spatial correlations of opportunity costs and environmental values		
	Uncorrelated	Negative	Positive
No Bonus	5 sessions	5 sessions	5 sessions
Bonus	5 sessions	5 sessions	5 sessions

SPATIAL COORDINATION & AUCTIONS

Effect of Agglomeration Bonus on auction performance across landscape types

	Mean Value (Standard Deviation)						Mann-Whitney test results: Prob > |z|		
	Uncorrelated landscape + No AB (T1)	Uncorrelated landscape + AB (T4)	Negative landscape + No AB (T2)	Negative landscape + AB (T5)	Positive landscape + No AB (T3)	Positive landscape + AB (T6)	T1 vs T4	T2 vs T5	T3 vs T6
Spatial coordination	**10.433** (1.906)	**8.267** (1.721)	6.633 (3.124)	5.6 (0.388)	**11.233** (1.716)	**11.833** (1.813)	0.000***	0.225	0.096*
Cost-effectiveness	**3.029** (0.368)	**2.411** (0.248)	**2.819** (0.463)	**2.405** (0.285)	2.966 (0.297)	2.842 (0.209)	0.000***	0.000***	0.133

INSIGHTS FOR POLICY

- AB reduces the auction's cost-effectiveness in the uncorrelated and negative landscape (no significant effect in the positive landscape)
- AB reduces spatial coordination (of selected parcels) in the uncorrelated and negative landscape
- AB enhances spatial coordination only in the positive landscape (where it is expensive to enrol high natural value land)

→ *Policymakers should be very cautious including AB in conservation auctions*

THANK YOU
FOR YOUR ATTENTION

EFFECT final event

4 October 2023, Brussels

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