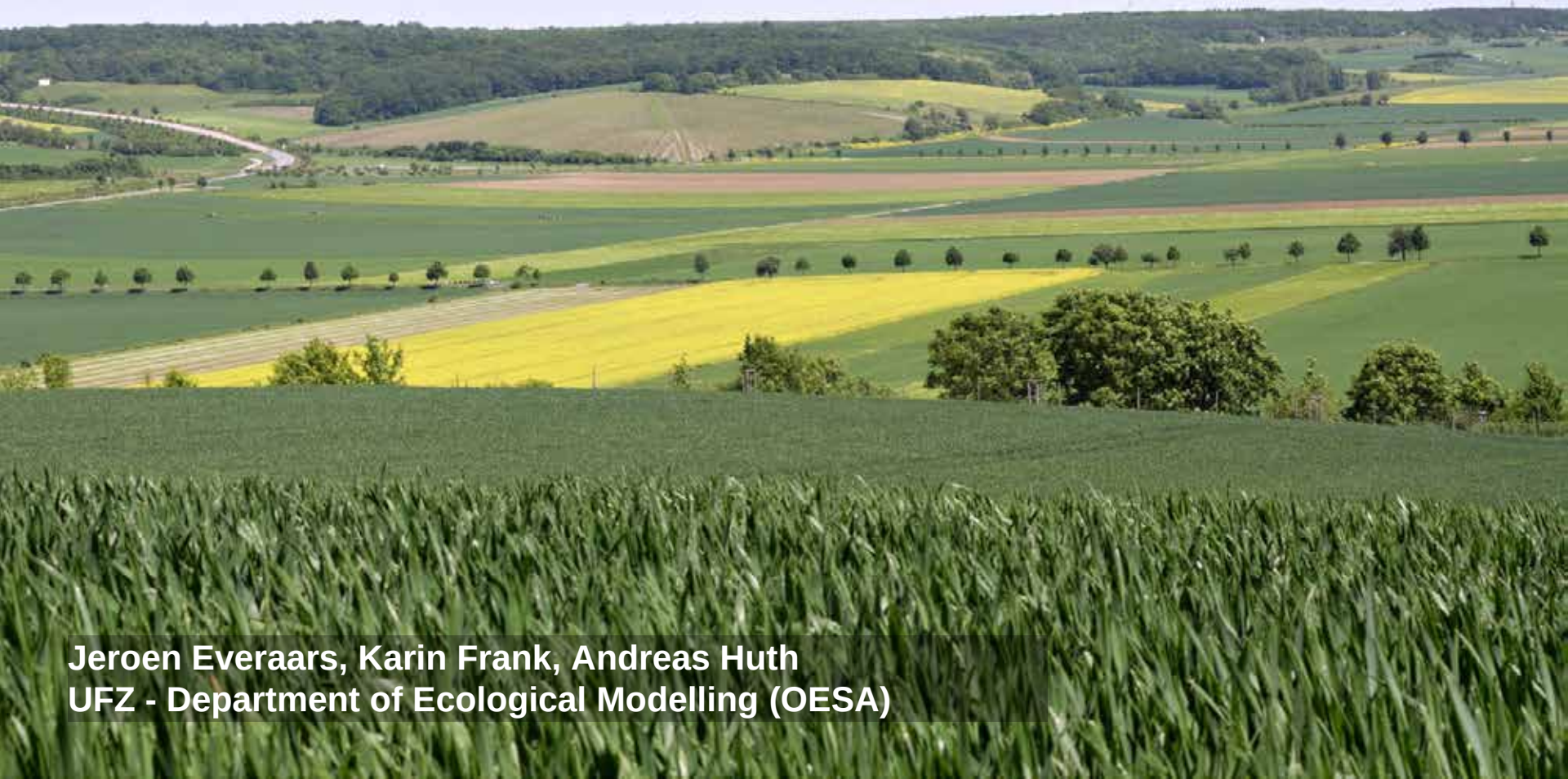
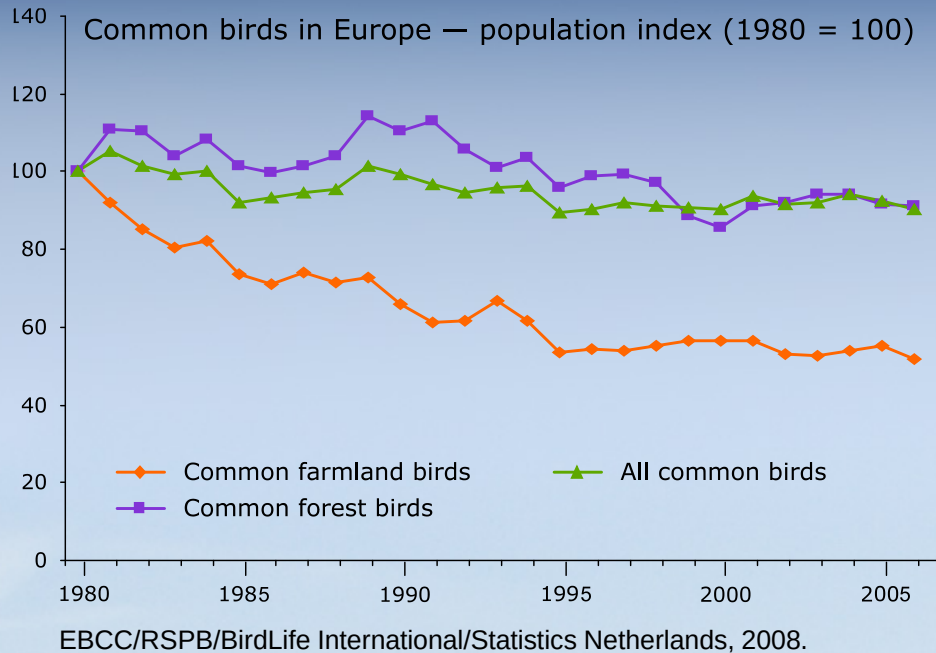


Impacts of bioenergy crops: an assessment approach with four example farmland bird species



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UFZ - Department of Ecological Modelling (OESA)

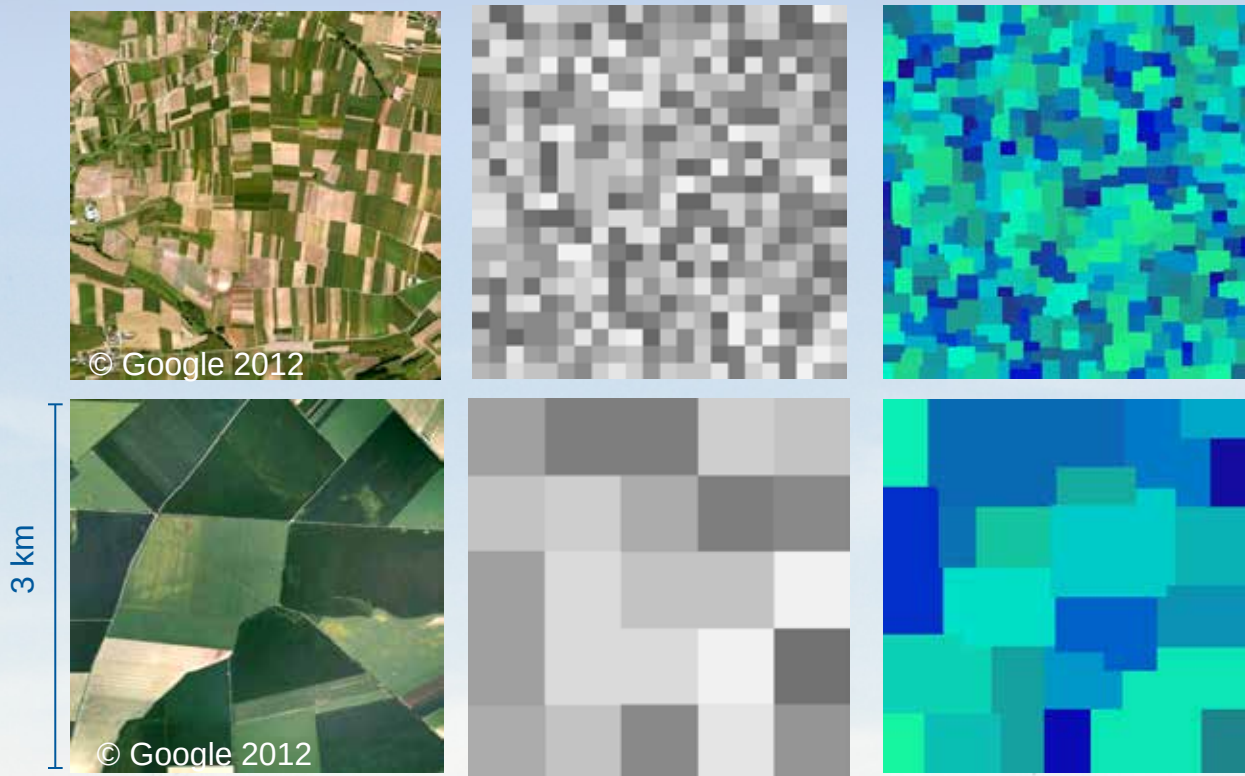
Farmland birds and bioenergy



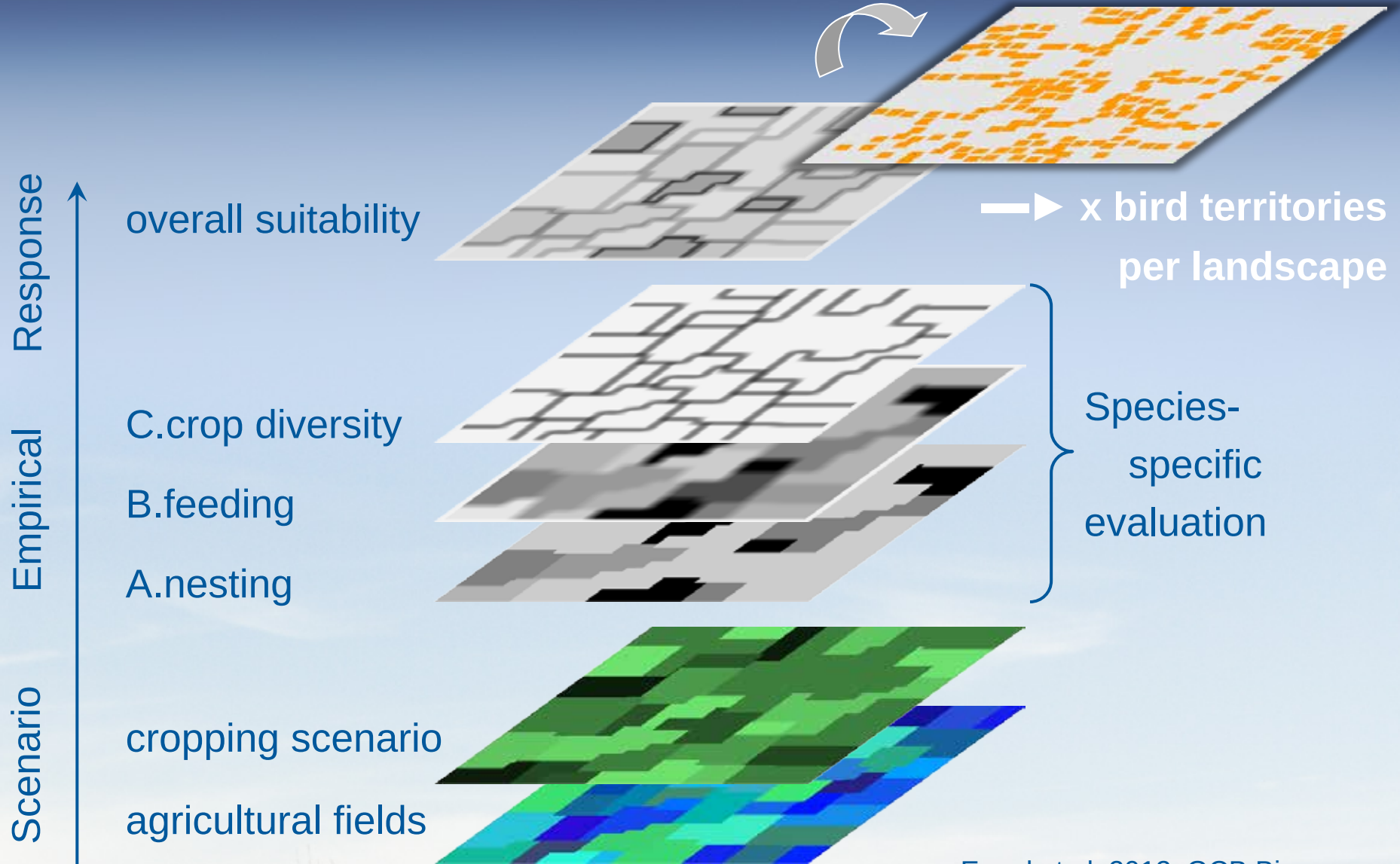
- farmland birds use crops for nesting and food search
- prefer crop diversity
- bioenergy crops reduce both requirements to some extent
- skylark, yellow wagtail, corn bunting and northern lapwing

Methods

- Focus on crop changes, field sizes and agglomeration
- Simplified model in a digital laboratory
- Flexible agricultural field mosaics

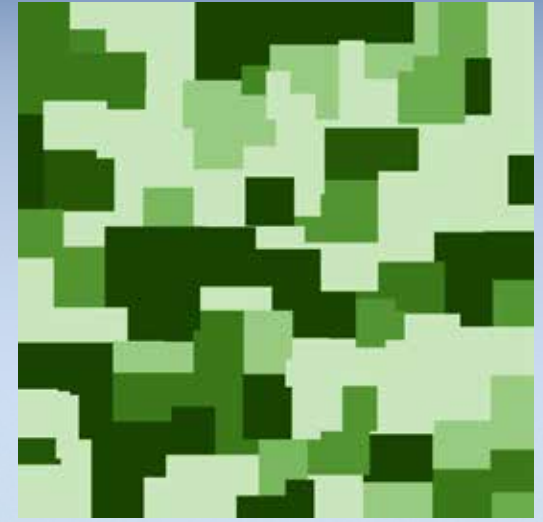


Evaluation process



Crop cultivation

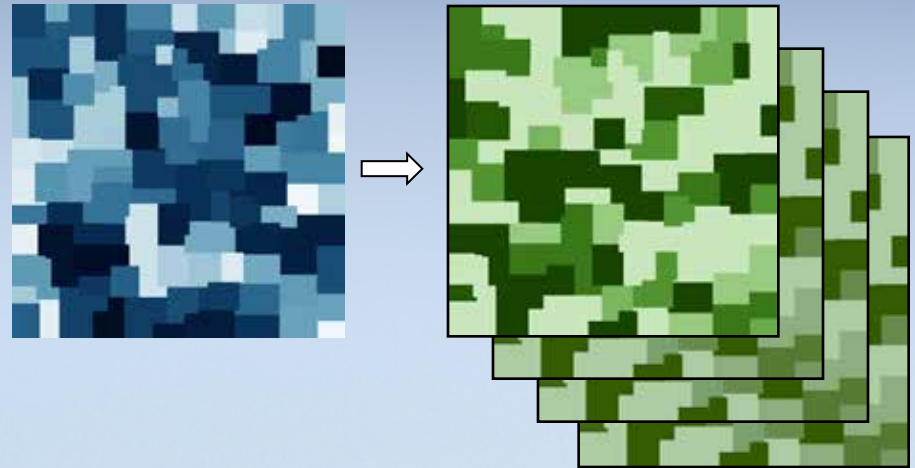
Crop:	Proportion:
Alfalfa	0.000
Barley	0.240
Beets	0.040
Grassland	0.000
Maize	0.100
Oat	0.040
Oilseed rape	0.070
Potato	0.000
Rye (summer)	0.015
Rye (winter)	0.015
Ryegrass	0.000
Set-aside	0.090
Sunflower	0.000
Triticale	0.000
Wheat	0.390



- crop list with proportions
- flexible, compare scenarios
e.g. regional differences or change

Bioenergy scenarios

	Baseline	Moderate bioenergy	Intensive bioenergy	Mitigation scenario
Alfalfa	0.000	0.000	0.000	0.000
Barley	0.240	0.230	0.170	0.220
Beets	0.040	0.020	0.035	0.020
Grassland	0.000	0.000	0.000	0.000
Maize	0.100	0.160	0.340	0.140
Oat	0.040	0.050	0.000	0.040
Oilseed rape	0.070	0.090	0.050	0.070
Potato	0.000	0.000	0.040	0.000
Rye (summer)	0.015	0.020	0.085	0.020
Rye (winter)	0.015	0.020	0.085	0.020
Ryegrass	0.000	0.000	0.045	0.000
Set-aside	0.090	0.010	0.000	0.100
Sunflower	0.000	0.000	0.000	0.000
Triticale	0.000	0.000	0.060	0.000
Wheat	0.390	0.400	0.090	0.370



- Multiple scenarios, evaluation of bioenergy
- Mitigation scenarios: increase of set aside, alfalfa, crop diversity or reduction in field size

Evaluation of farmland species with empirical data

	Skylark		
	A	B	C
	Nest	Food	Local diversity
Alfalfa	0	4	
Barley	1	3	
Beets	1	0	
Grassland	2	2	
Maize	1	3	
Oat	0	3	
Oilseed rape	0	1	
Potato	1	0	
Rye (summer)	3	3	
Rye (winter)	1	3	
Ryegrass	2	2	
Set-aside	5	5	
Sunflower	0	1	
Triticale	1	3	
Wheat	2	3	

	Bird 2		
	A	B	C
	Nest	Food	Local diversity
Alfalfa	3	4	
Barley	2	3	
Beets	0	0	
Grassland	2	2	
Maize	2	0	
Oat	2	3	
Oilseed rape	1	3	
Potato	5	0	
Rye (summer)	2	3	
Rye (winter)	2	3	
Ryegrass	2	2	
Set-aside	1	5	
Sunflower	2	1	
Triticale	2	3	
Wheat	1	3	

crop scenario



evaluation

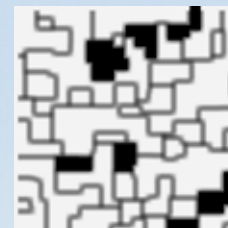
A



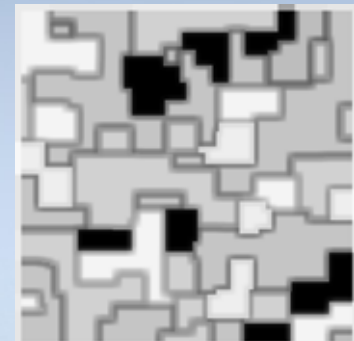
B



C



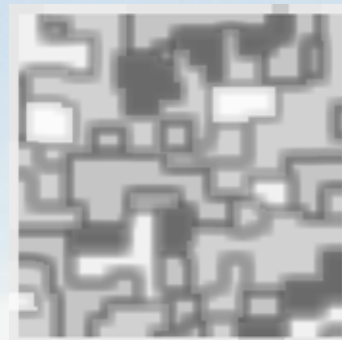
overall landscape quality



breeding pair density

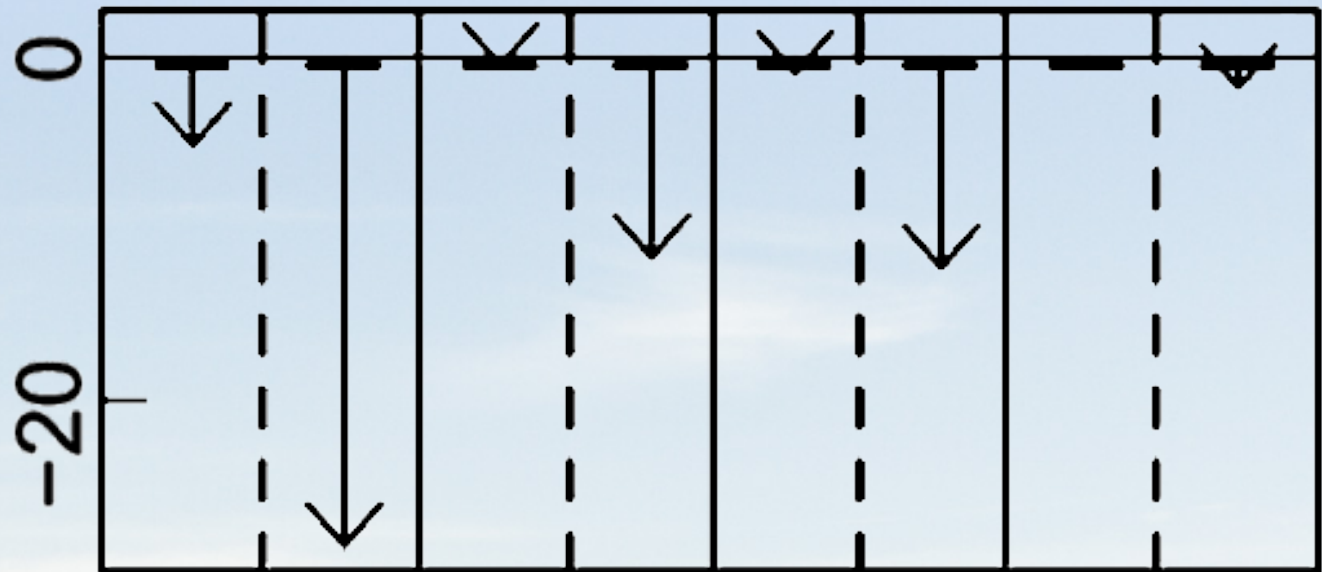
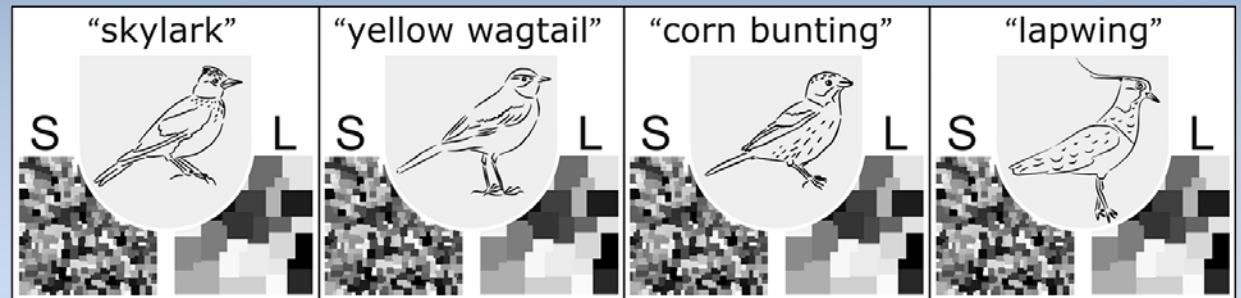
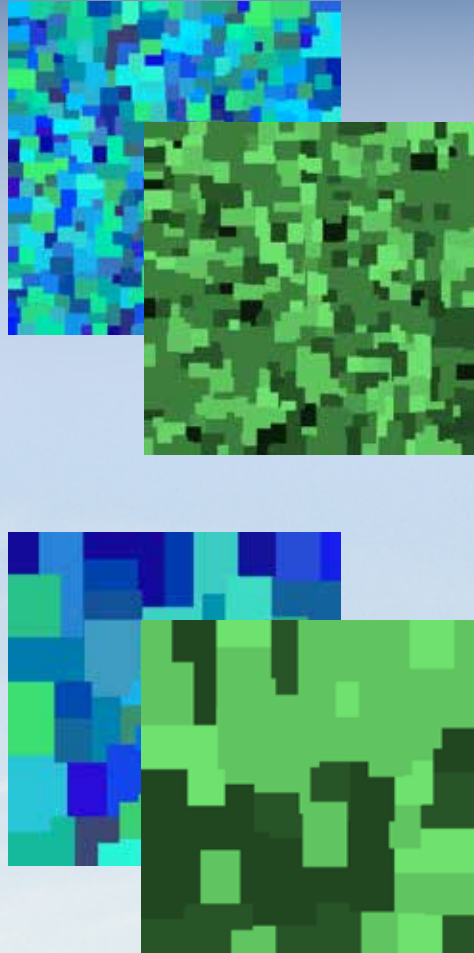


etc...

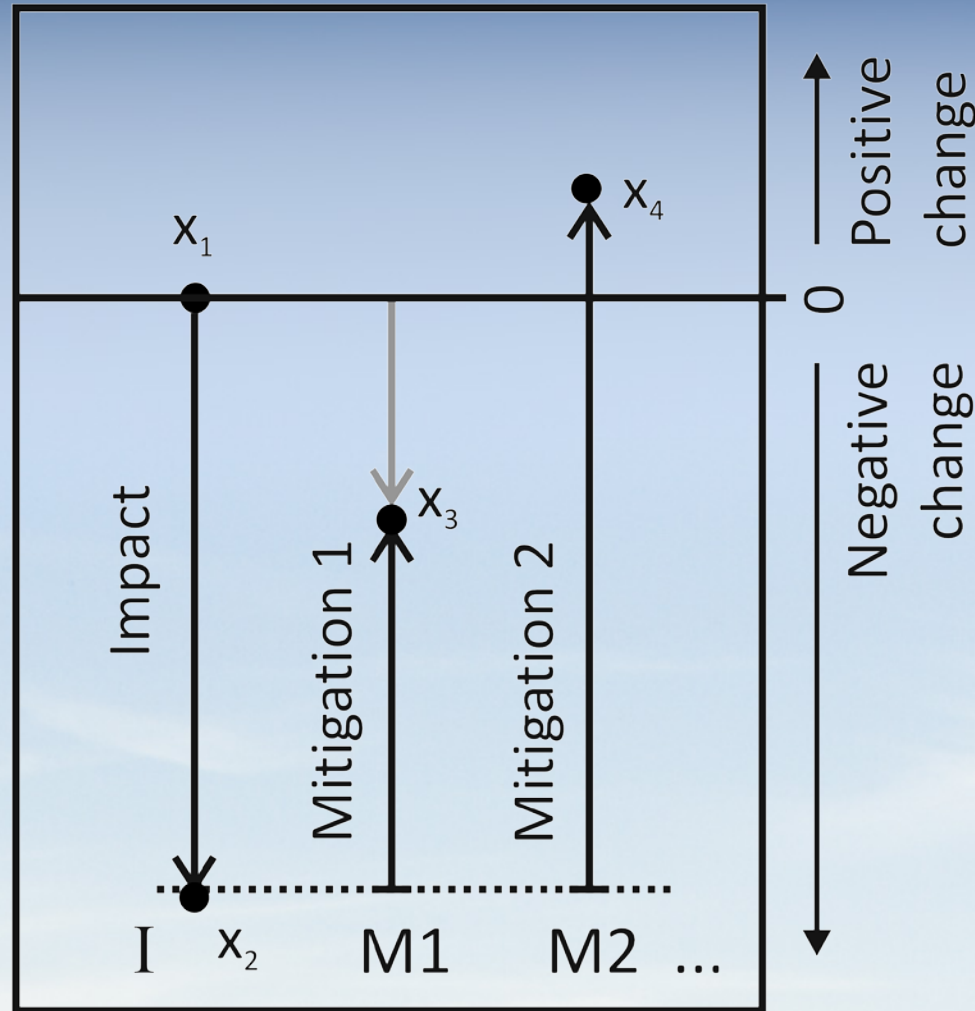


Impacts depend on landscape type

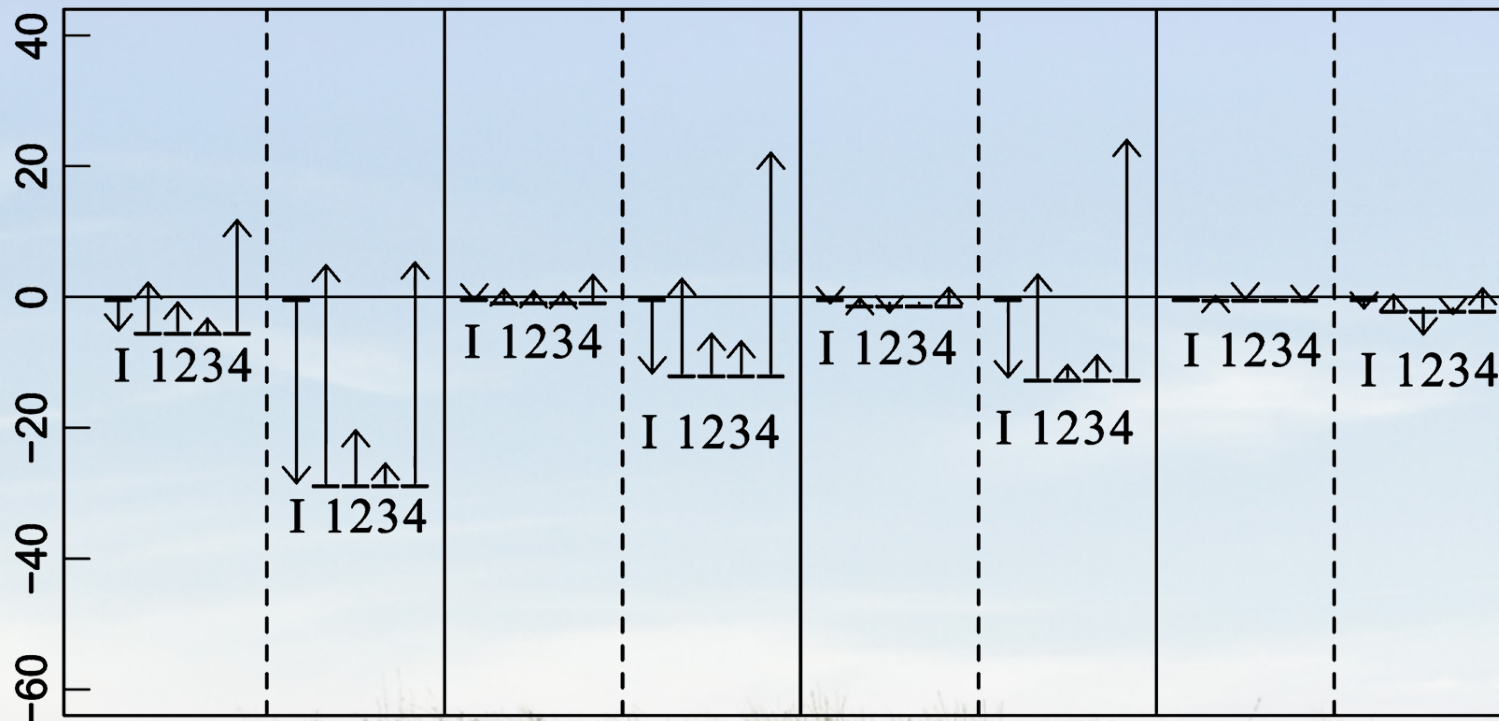
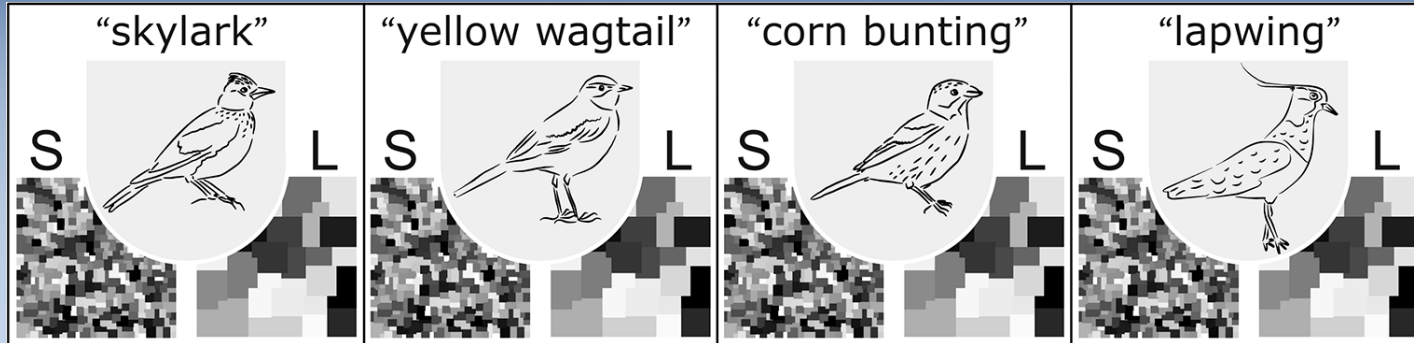
Impact of bioenergy (% change)



Including mitigation strategies in comparison

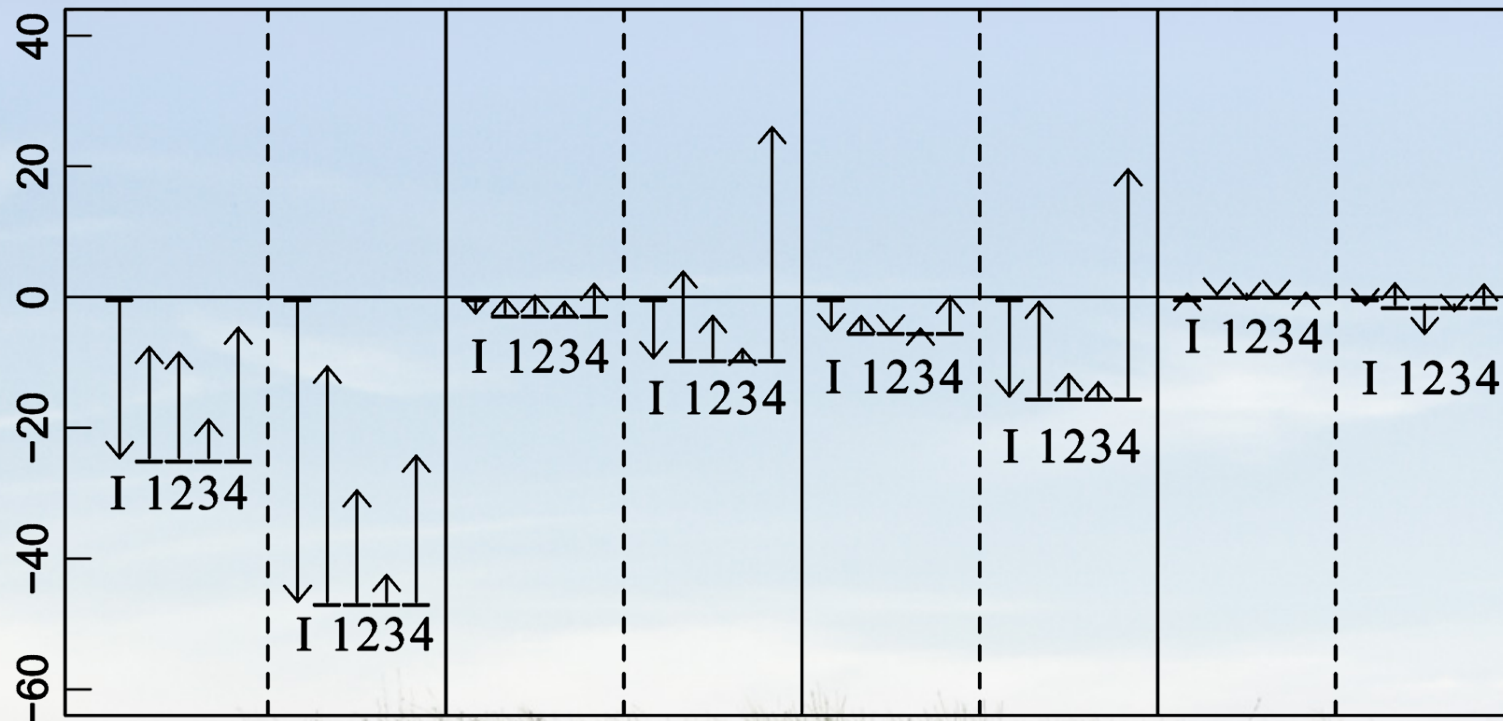
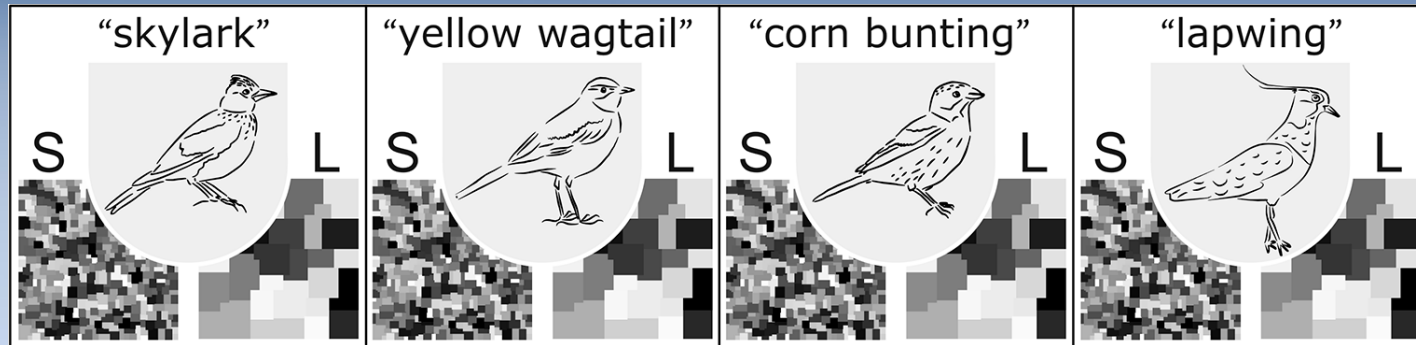


Moderate bioenergy



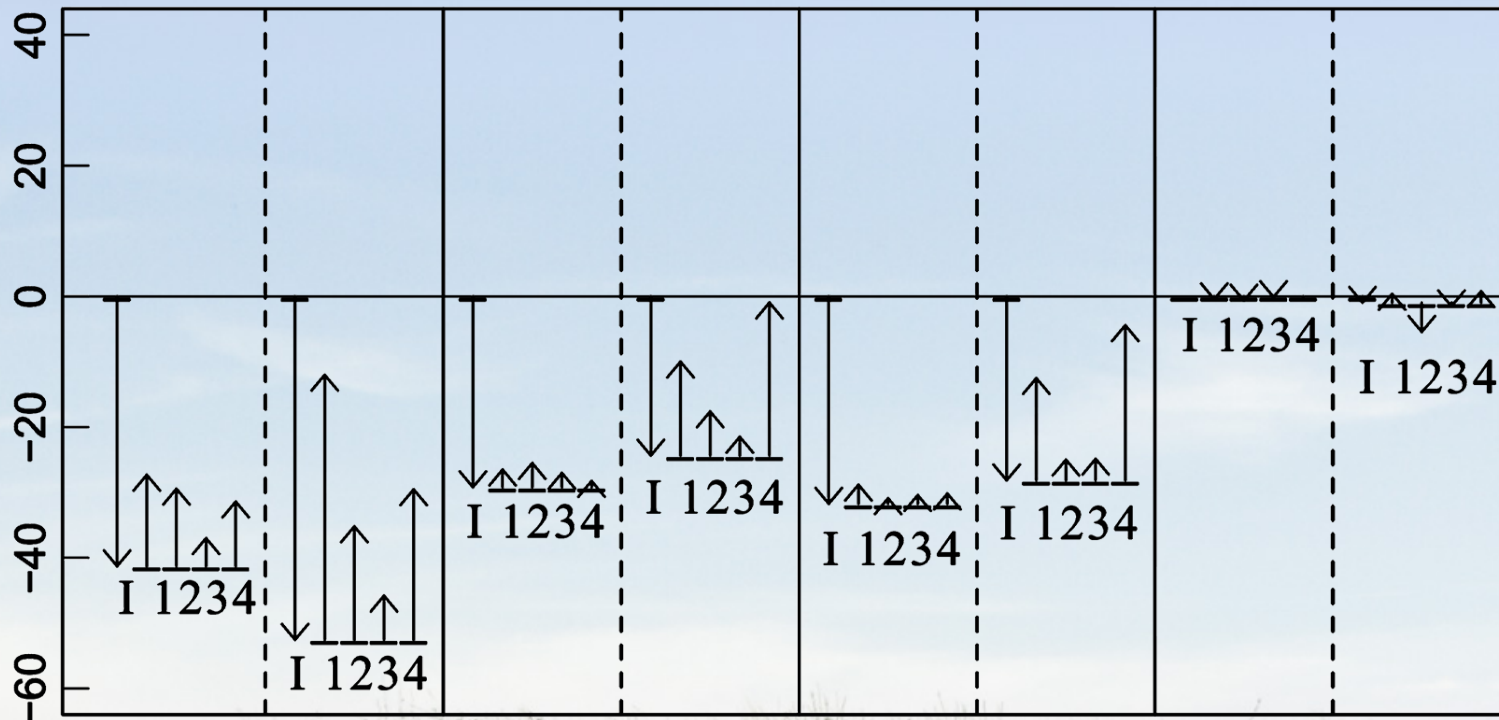
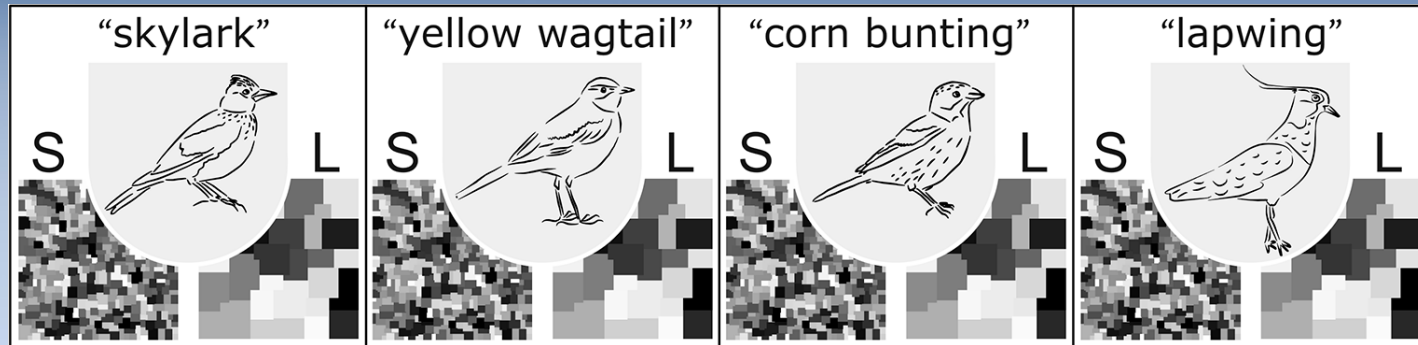
- 1: set aside -
- 2: alfalfa -
- 3: crops -
- 4: field size -

Intensive bioenergy



- 1: set aside -
- 2: alfalfa -
- 3: crops -
- 4: field size -

Intensive bioenergy + field aggregation



- 1: set aside -
- 2: alfalfa -
- 3: crops -
- 4: field size -

Conclusions

- Approach provides insight in possible effects of changes in the agricultural field mosaic
- Impact of bioenergy on corn bunting and yellow wagtail, especially on skylark
- Landscape configuration (field size, agglomeration) has a clear additional impact
- Negative effects of bioenergy crops can be mitigated
- Species rich set-aside fields should be maintained and field sizes should be kept small

Thank you for your attention!

