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Designing efficient agri-environmental schemes under consideration of the common agricultural Policy in Europe

Bettina Matzdorf,
Klaus Müller, Christian Kersebaum, Joachim Kiesel, Thomas Kaiser
Leibniz-Centre for Agricultural Landscape Research (ZALF) e.V.
Müncheberg, Germany

Outline

Agri-environmental measures (AEM) in Europe

institutional framework, implementation and weaknesses

Result-oriented payments as one approach to enhance AEM

characterization, advantages, disadvantages (limits)

Examples of result-oriented payments

Environmental issue, designing, (implementation)

Outlook and Conclusion

Findings base on an ongoing perennial evaluation of the agri-environmental program in Brandenburg (Germany).

Institutional Framework of AEM

Agri-environment schemes are payments (including implicit transfers such as tax and interest concessions) to farmers and other landholders to address environmental problems and/or promote the provision of environmental amenities (OECD 2003).

Subject of our research are area-based agri-environmental measures (AEM) including organic farming of the so called second pillar of the Common Agricultural Policy (CAP).

- AEM are the only mandatory part of Rural Development Plans (RDP) under the current Council Regulation (EC) No 1698/2005.
- AEM are summarized in agri-environmental programs (AEP).
- AEM have been implemented in all European Member States.

Institutional Framework of AEM

Objectives

- quite broad – since 2000 focus on environmental goals

Definition of eligible level

- AEM must go beyond the legal requirements defined as good farming practice or cross compliance requirements

Duration of contracts

- Mainly 5 years

Calculation of payments

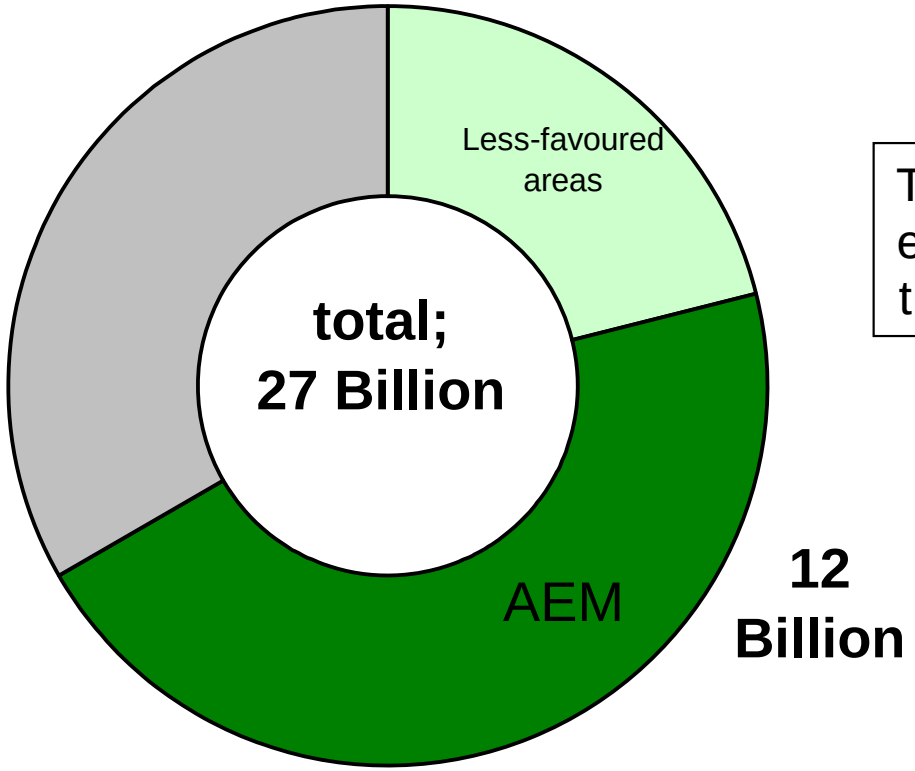
- Compensation for additional costs and loss of income

Payment for good practices (action-oriented)

- Incentives are linked to environmentally friendly-sound agricultural practices

Implementation of AEM

EAGGF-Guarantee
- Rural Development Financial Expenditure (Euro)
in EU-15 (2000-2005)



About 25 % of the agricultural land in the EU is covered by agri-environment measures.

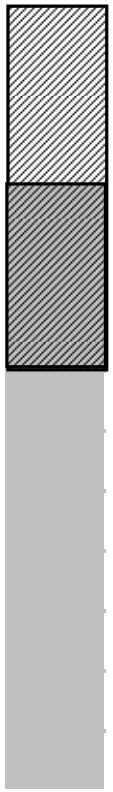
This are only the financial expenditure of the EU without the share of Member States.

Source: European Commission, DG for Agriculture and Rural development, Unit F.2 and I.4

Example of a Typical AEP

Horizontal and targeted AEM
of the agri-environmental program in Brandenburg (Germay)

AEM in 2004 (without modulation measures)



A6	Maintenance of extensive grassland and heath land through grazing	
A7	Maintenance of traditional orchards	targeted AEM
B6	Permanent set-aside of arable land	
A3	Late and restricted mowing	
A4	Small-scale grassland management	targeted AEM (top-up)
A5	Maintenance of grassland management in ‚Spreewald'	
A1	Extensive grassland management	
A2	Extensive management and maintenance of wetlands (floodplains)	horizontal AEM
B1	Integrated farming (vegetables and fruits)	
B3AL	Organic farming arable land	
B3GL	Organic farming grassland	
B4	Erosion reducing/ soil-conserving measures	
B5	Conversion of arable land into grassland	
D	*Maintenance and conservation of ponds*	

Weaknesses of Current AEM

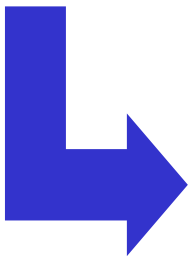
The main lack of effectiveness of horizontal AEM is caused by their main characteristic:

- no specific environmental objectives targeting on and
- seeking at a high participation.

Multiple objectives

- risk that at least no objective can be achieved effectively

The **lack of spatial equivalence** and **inflexible farm management practice** are main sources for lost of effectiveness of the current AEM.

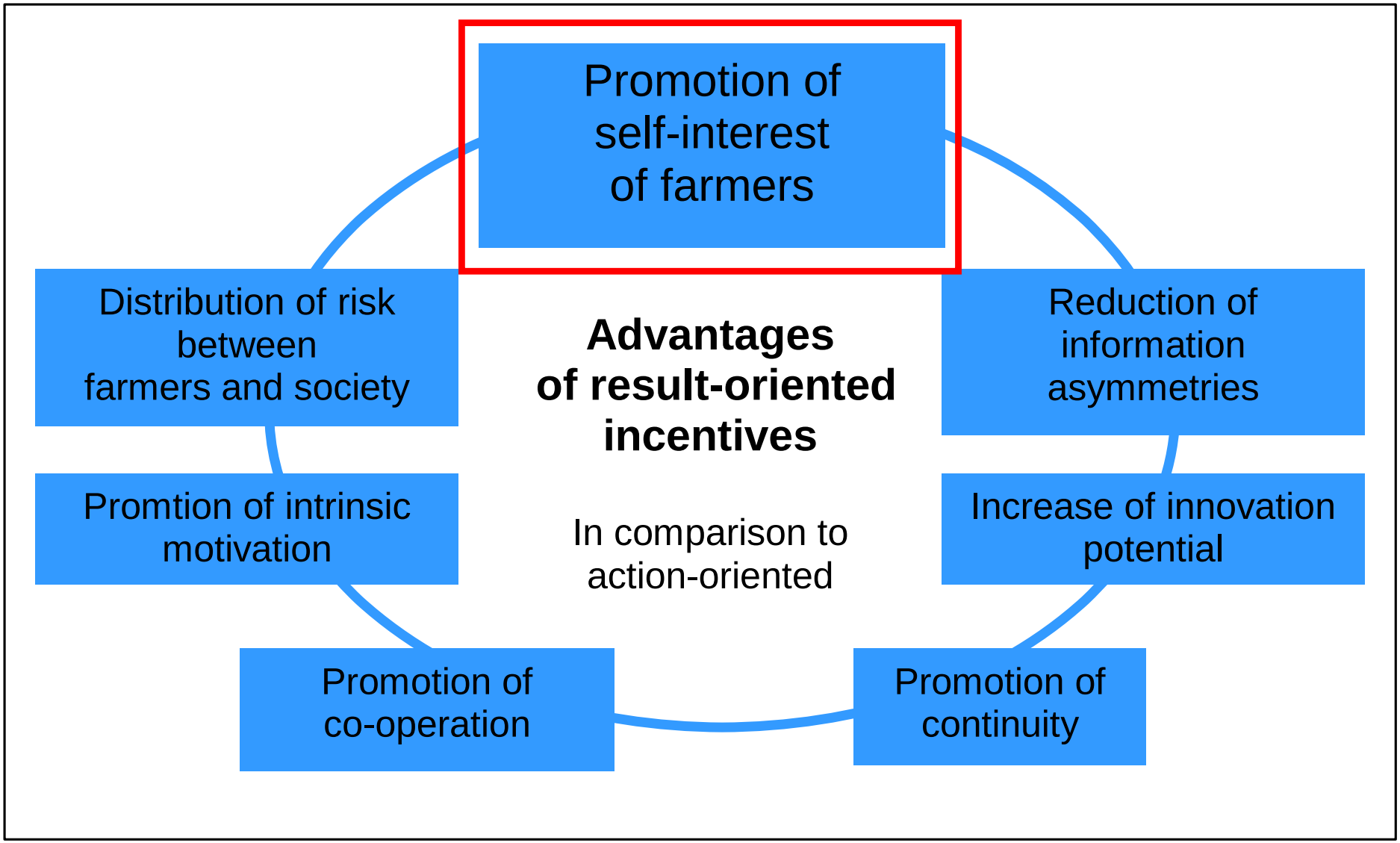


How can we design more effective AEM under consideration of transaction cost?

Result-oriented Incentives

Result-oriented incentives are linked directly to the desired ecological good or environmental quality objective.

Advantages of the Result-oriented Approach



Disadvantages of the Result-oriented Approach

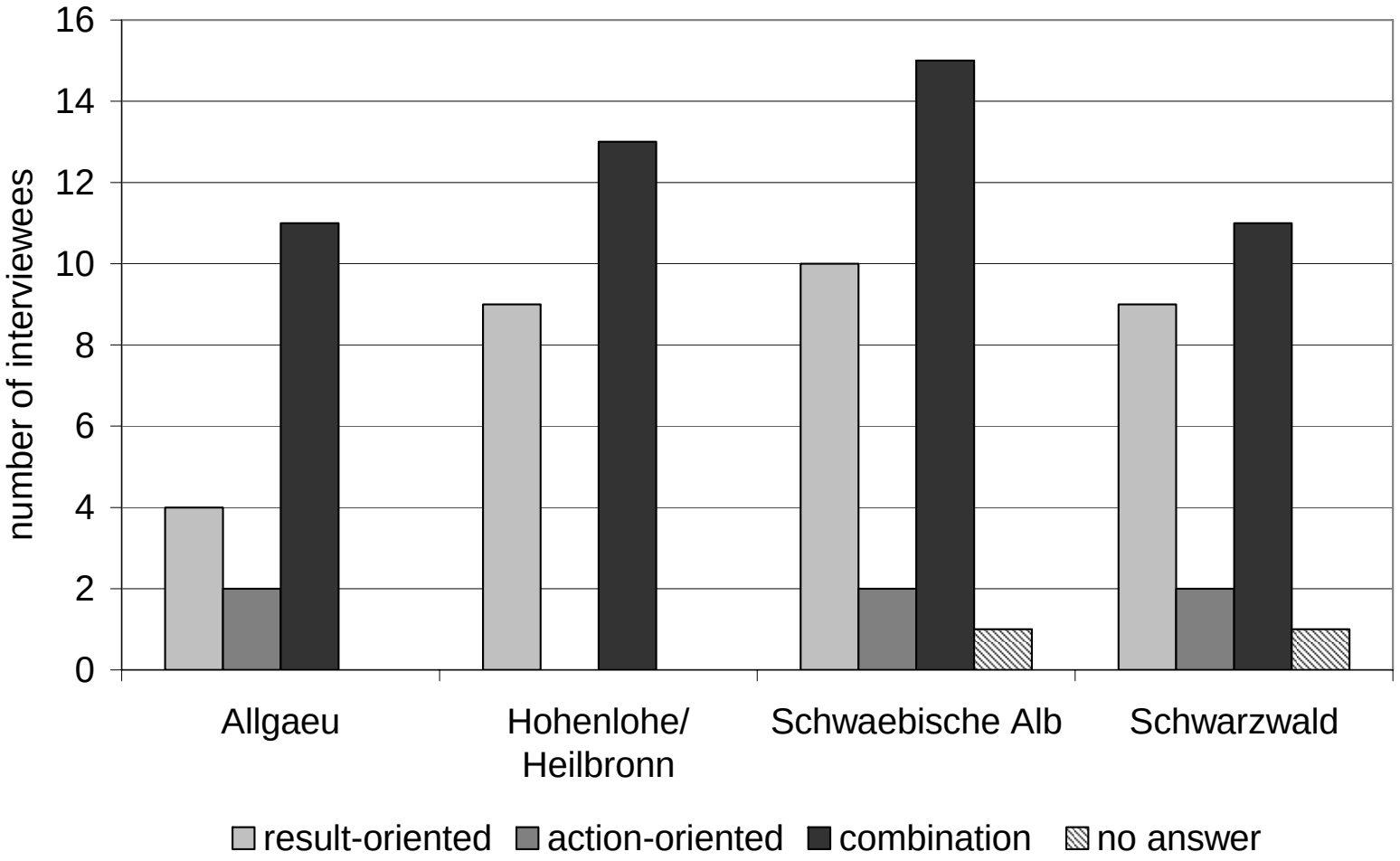
- very good environmental information and data are necessary,
- may entail high costs for planning and enforcement,
- may be viewed as inequitable by some producers

Agri-environmental payments cannot be based on actual environmental performance, such as nutrient runoff or soil erosion, because actual performance cannot be monitored at a reasonable cost and often varies with the weather or other factors outside the producer's control. …

However, average or expected environmental performance can sometimes be estimated using physical process models … (Claassen et al. 2001)

What do the farmers think about?

Results of 90 interviews (2006) of farmers, who have participated in result-oriented AEM in Baden-Wuerttemberg (Germany).



56 % prefer a combination of result- and action-oriented incentives

30 % prefer an exclusively result-oriented incentives

Source: own interviews 2006

Two Examples for Designing of Result-oriented AEM

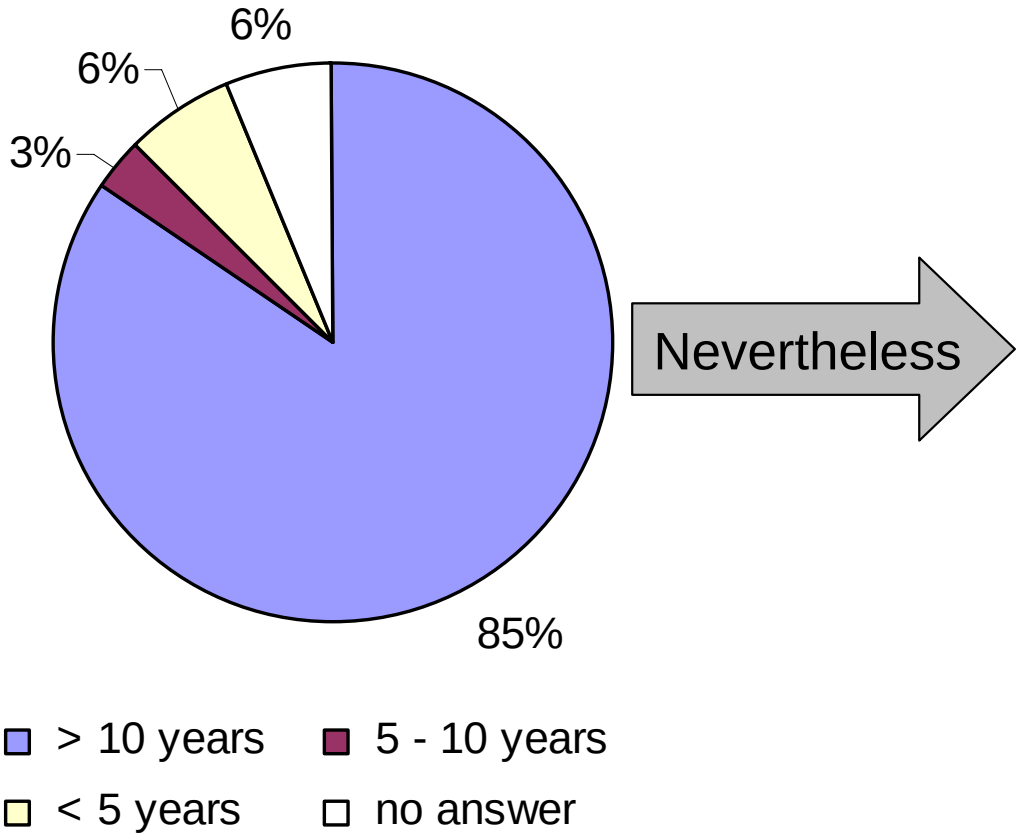
- Conservation and enhancement of biodiversity
  - using actual environmental state indicators to remunerate farmers for the conservation of species-rich grassland on common UAA
- Enhancement of water quality
  - using simulated environmental indicators to remunerate farmers for the reduction of nitrate leaching from the root zone

Case Study Area Brandenburg

- total area of 2.9 million ha
- ca. 45 % agricultural and 37 % forest land use
- 78 % of agricultural land is arable land and 22 % grassland.
- ca. 50 % of the grassland under AEM
- ca. 10 % of arable land under AEM
- Approx. 48 Mill. Euro for AEM yearly

Challenges in the Context of Conservation and Enhancement of Species-rich Grassland

Continuous participation in extensive grassland management (horizontal AEM) in Brandenburg



Source: IACS 2004 (n=97)

Nevertheless

The nature value of many supported areas is not better than without AEM.

Improvement of quality

- Depends on historical use,
- Needs specific management adaptation, e.g. to reduce the nutrient content in the soil,
- Needs sometimes a very long time

Purpose of the Result-oriented AEM for Species-rich Grassland

- Identification of species-rich common grassland by (with the help of) farmers
- Outside of nature conservation areas, payment only for still species-rich grassland
- Higher management flexibility for farmers

Farmers should be able to check the eligibility of their grassland by themselves.

Developing of Indicator Checklist for Result-oriented Grassland AEM

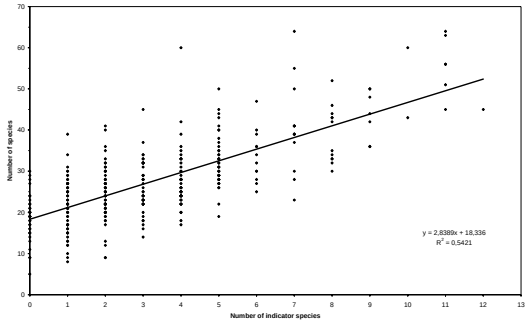
Expert based **identification of 318 vascular plants species**
- typical for extensively used grassland in Brandenburg

Database
1551 vegetation samples

Selection of master indicator checklist
criteria:
- high frequency in specific grassland communities
- to be recognizable easily (mostly herbs),
- no poison plants

comparison with other existing regional checklists (Baden-Wuerttemberg and Lower Saxony)

Proving of suitability
Correlation with:
- the number of plant species,
- the number of species indicating extensive use,
- the number of endangered species



Indicator checklist
31 vascular plant species and groups of species

Quality and Potential Extent of Eligible Grassland

We recommend using four indicators of our checklist as threshold.

Criteria: Grassland quality and political framework

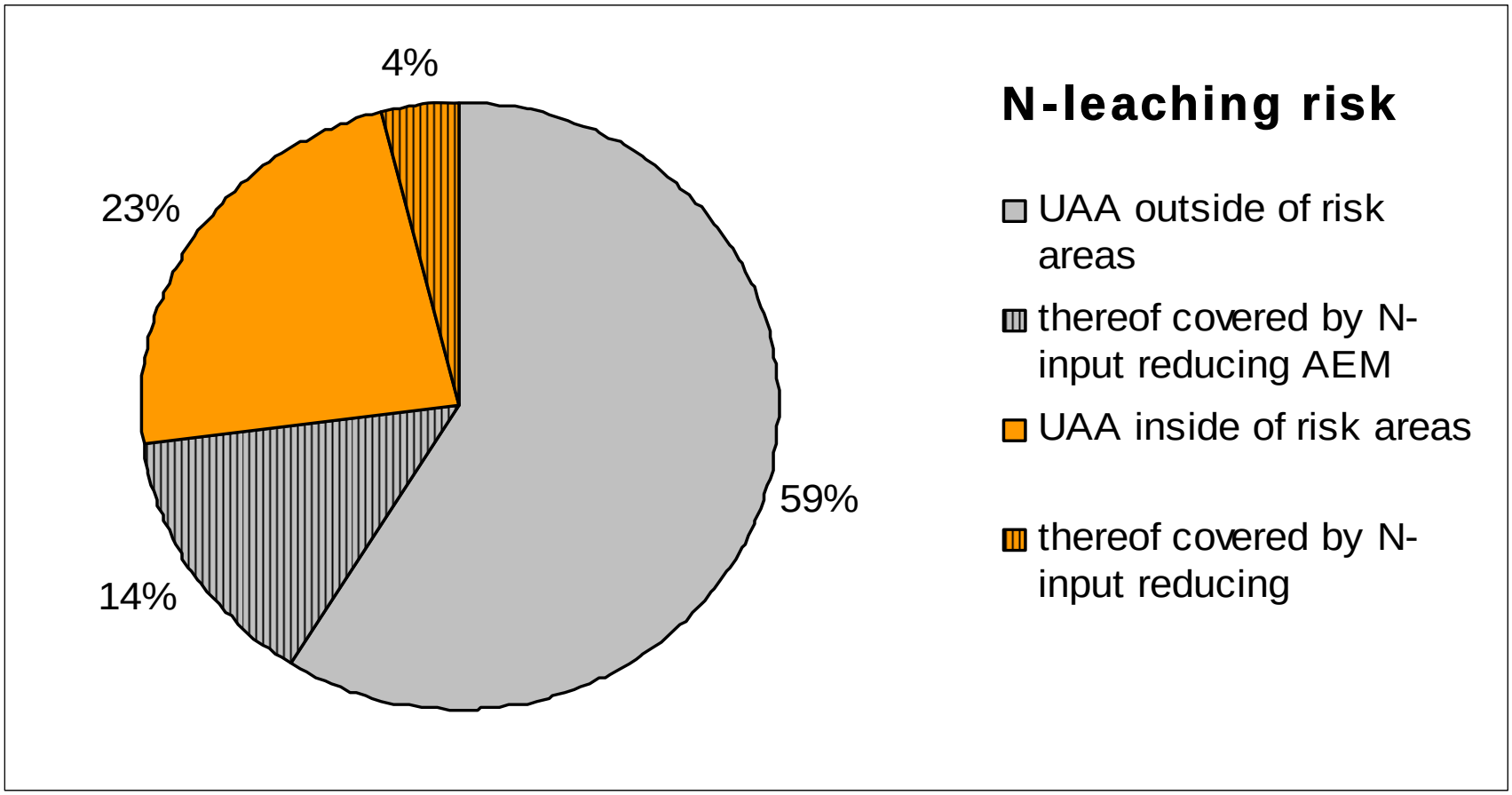
Approx. 30 % of the total grassland and 36 % of the grassland covered by AEM 'extensive grassland management' would be eligible.

The definition of a threshold for eligible areas is finally a political decision!

number of indicator species	site group	number of species	number of species indicating extensive use	number of endangered species
3	mesic to moderately dry	29,4	4,3	0,7
4		**32**	**5,5**	**1**
3	damp	25,6	5,8	1
4		**29,8**	**7,5**	**1,5**

Eligible grassland are distributed throughout Brandenburg and on all relevant sites

Challenges in the Context of Water Quality



	Area in %								
N-risk	**A1**	**B3AL**	**B3GL**	**A2**	**B1**	**B4**	**B5**	**B6**	**total**
very low	80	47	75	88	60	53	51	82	64
low	9	13	9	2	12	14	17	0	11
medium	7	19	10	7	17	13	20	14	13
high	3	21	6	3	11	18	11	0	11
very high	0	1	0	0	0	2	0	0	1

own calculations based on data of Kersebaum et al. 2006 and IACS 2004

Simulation of N-leaching for Result-oriented AEM

Simulation of **N-leaching from the root zone** for four agricultural practices by using the process-oriented model HERMES (Kersebaum, 1995):

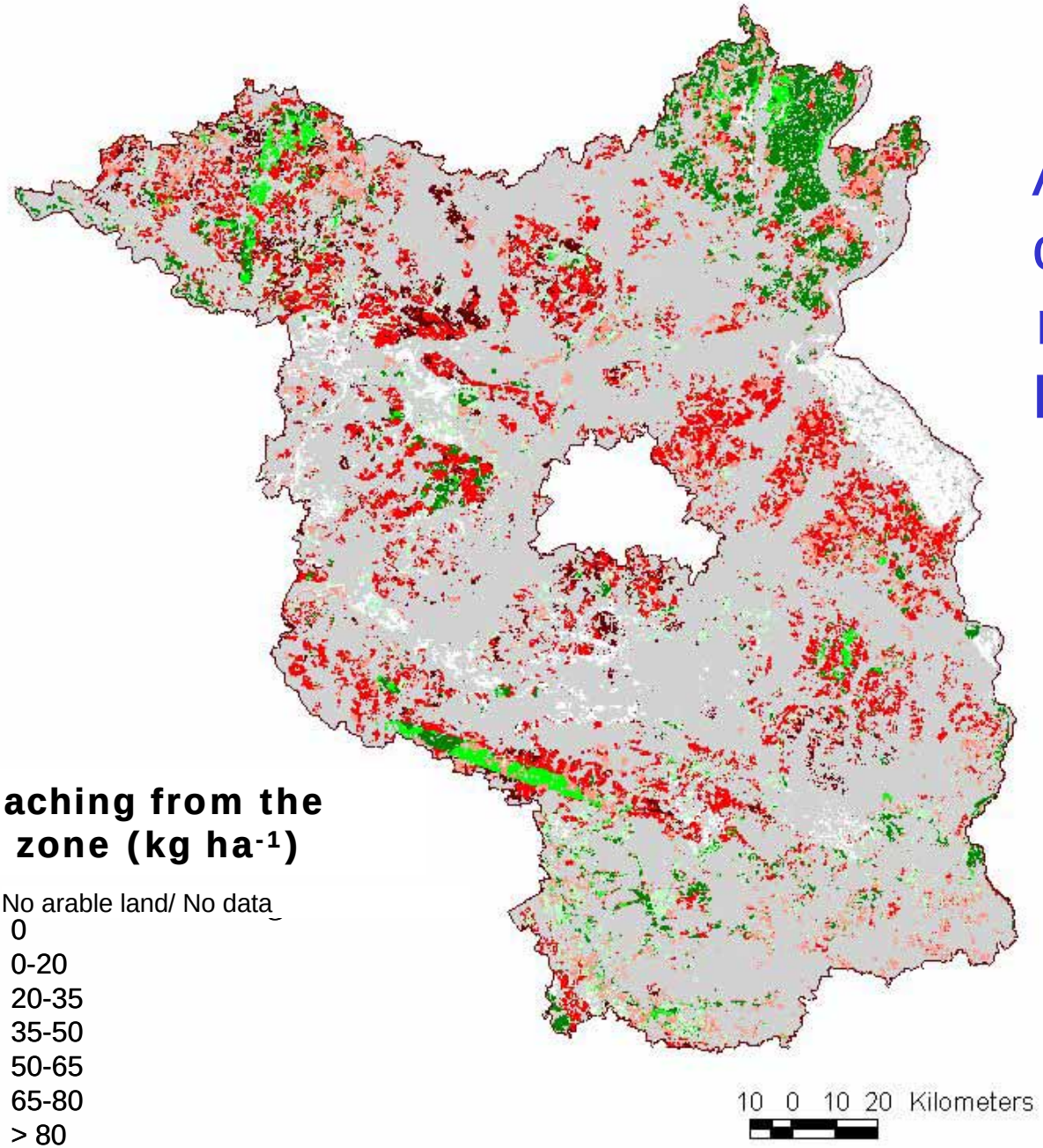
- Conventional arable land
- Conventional grassland
- Organic arable land
- Organic grassland/ extensive grassland management

Calculation of the **N-leaching reduction** for three scenarios:

- Conversion of conventional arable land into extensive grassland,
- Changing conventional arable land into organic arable land
- Changing conventional grassland into organic grassland or extensively used grassland

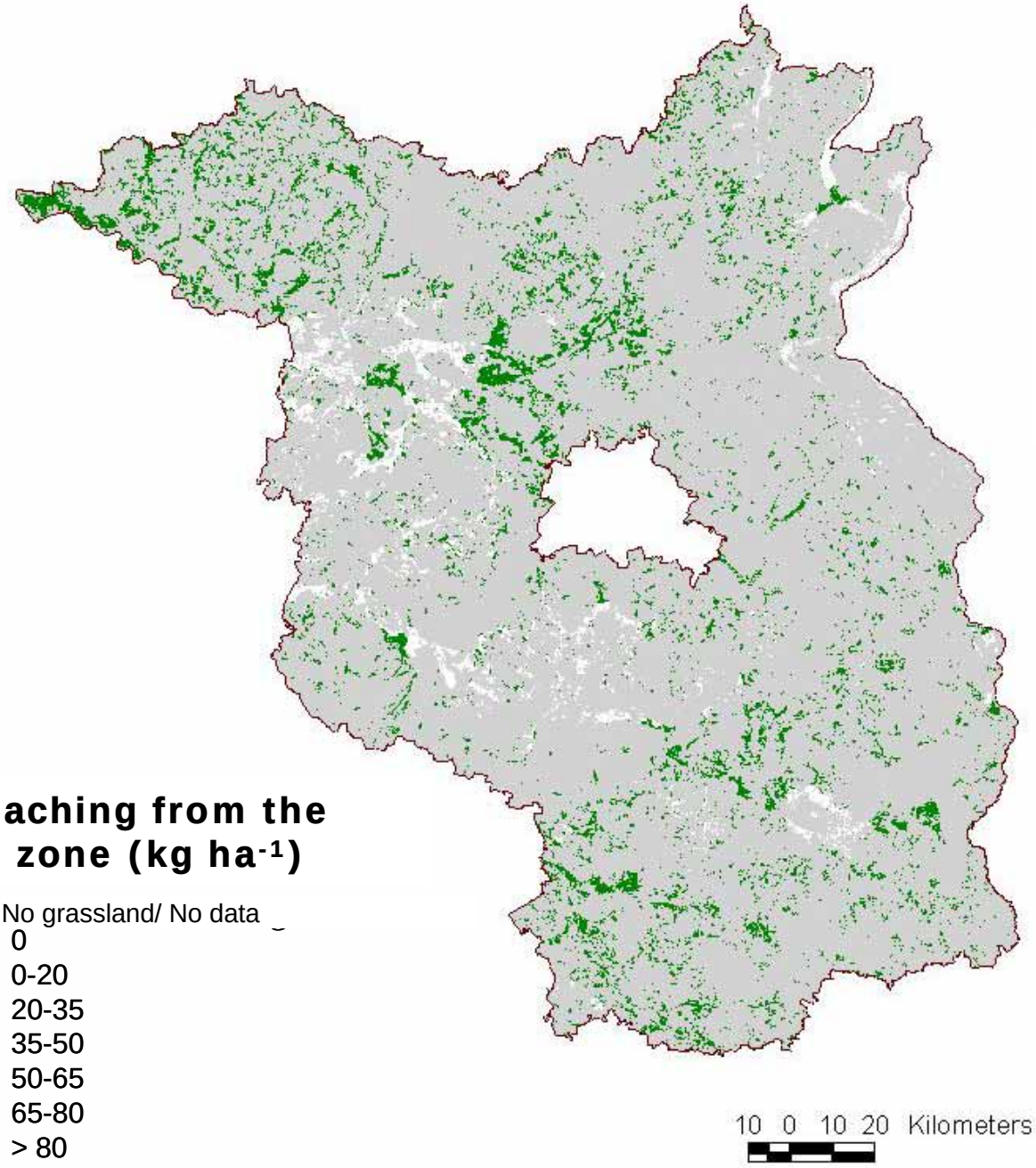
Aggregation of the N-leaching reduction for the three scenarios at the **smallest** agricultural **administrative levels** (unite 'flur' with an average size of 190 ha)

Arable land under conventional management in Brandenburg



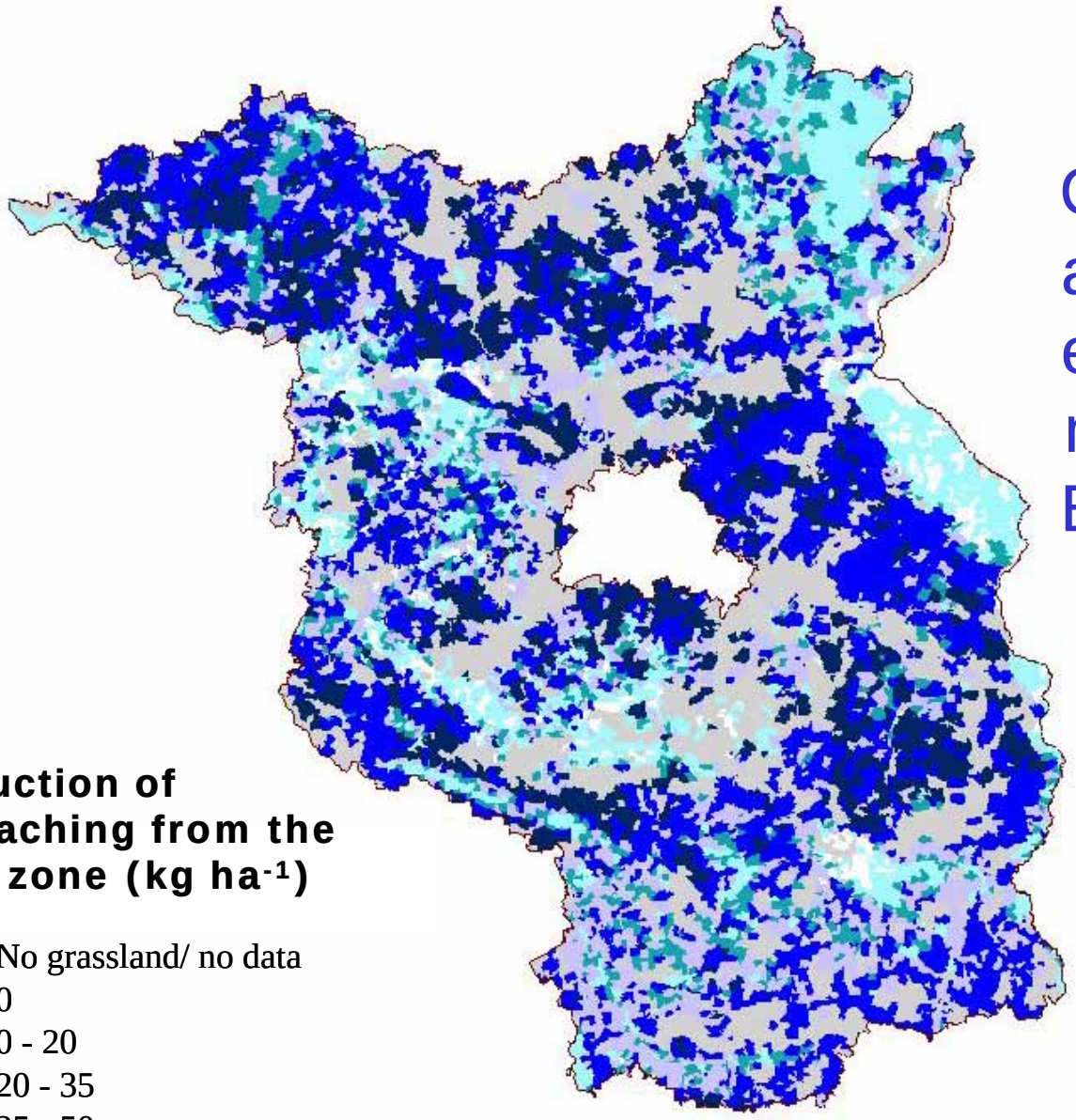
(own calculations based on data of Kersebaum 2004 and IACS 2002)

Extensive grassland management in Brandenburg



(own calculations based on data of Kersebaum 2004 and IACS 2002)

Conversion of arable land into extensive grassland management in Brandenburg



Reduction of N-leaching from the root zone (kg ha^{-1})

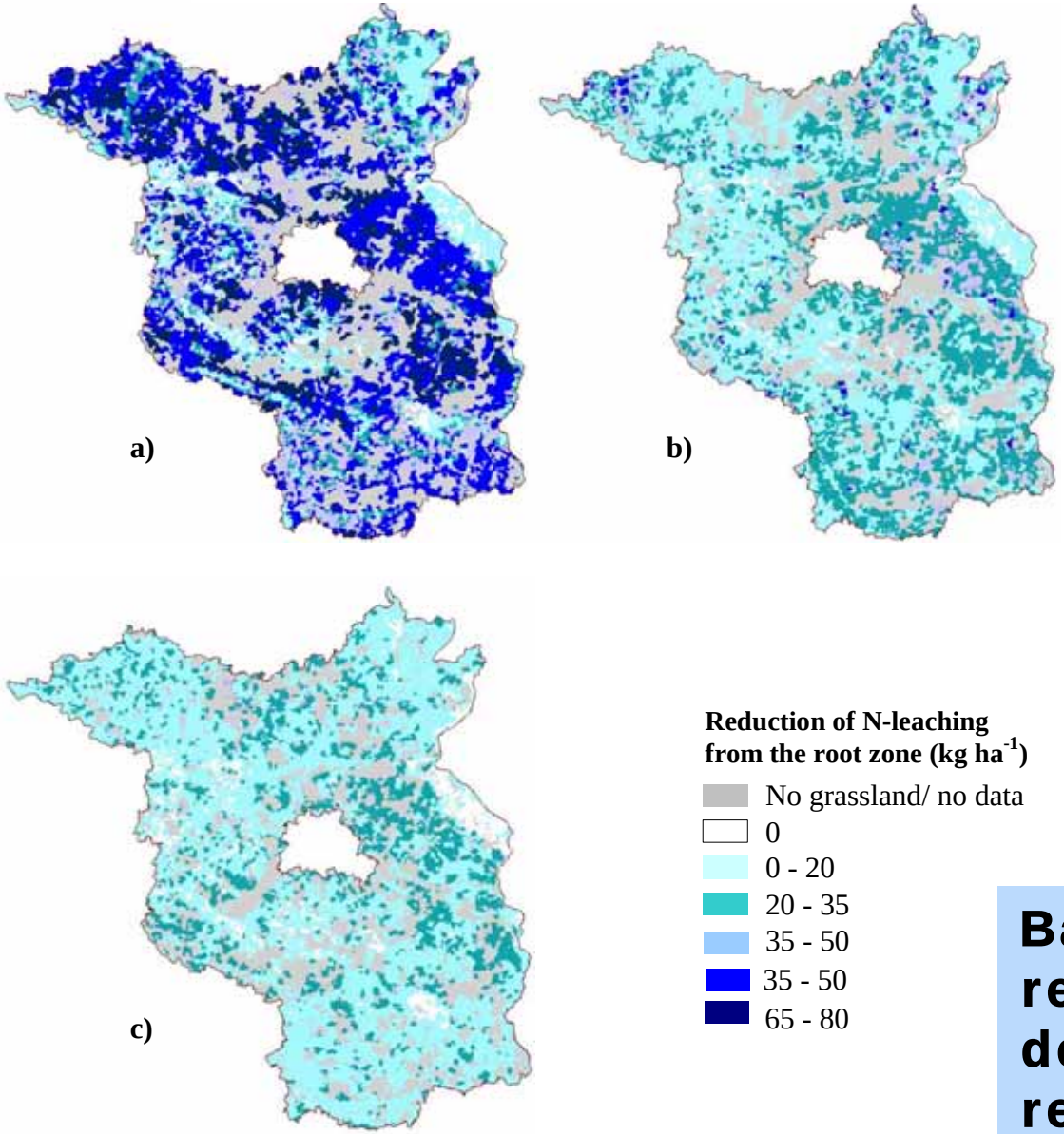
- No grassland/ no data
- 0
- 0 - 20
- 20 - 35
- 35 - 50
- 35 - 50
- 65 - 80

10 0 10 20 Kilometers

(own calculations based on data of Kersebaum 2004 and IACS 2002)

Calculation at the agricultural administrative level ‚flur'

Spatial explicit N-leaching Reduction for Three Different Management Adaptation



Average N-leaching reduction calculated for whole Brandenburg

a) Conversion of conventional arable land into extensive grassland = **44.0 kg N ha^{-1}**

b) Changing conventional arable land into organic arable land = **22.1 kg N ha^{-1}**

c) Changing conventional grassland into organic grassland or extensively used grassland = **5.8 kg N ha^{-1}**

Based on these findings, a result-oriented premium can be designed depending on the reduction of N in kg N ha-1.

Outlook and Conclusion

The effectiveness of agri-environmental payments can be improved by realizing more flexibility for farmers to choose suitable practices decentrally and under consideration of specific spatial site conditions and the specific farm conditions

Result-oriented incentives make this possible if suitable environmental indicators can be developed.

To increase the potential for the implementation of that kind of AEM process-oriented models can be used.

The ongoing development of GIS is promising a high potential for further implementation of result-oriented AEM.

However, there is no question, result-oriented payments are only one approach and not suitable for all kind of issues.

Reference

OECD (2003). **Mesures agro-environnementales: Tour d'horizon des évolutions.** Groupe de travail mixte sur l'agriculture et l'environnement. Organisation for Economic Co-operation and Development, Paris.

Roger Claassen, LeRoy Hansen, Mark Peters, Vince Breneman, Marca Weinberg, Andrea Cattaneo, Peter Feather, Dwight Gadsby, Daniel Hellerstein, Jeff Hopkins, Paul Johnston, Mitch Morehart, and Mark Smith. (2001): **Agri-Environmental Policy at the Crossroads: Guideposts on a Changing Landscape.** Agricultural Economic Report Number 794.

Kersebaum, K.-C. (1995). **Application of a simple management model to simulate water and nitrogen dynamics**. *Ecological Modelling*, *85*, 145-156.

Thank you!

Next steps in Brandenburg

2007

- Validation of indicator checklist (200 field samples)
- Making up an information brochure and flyer
- Information and training courses for farmers
  (result-oriented approach, recognizing of the indicator species)

2008

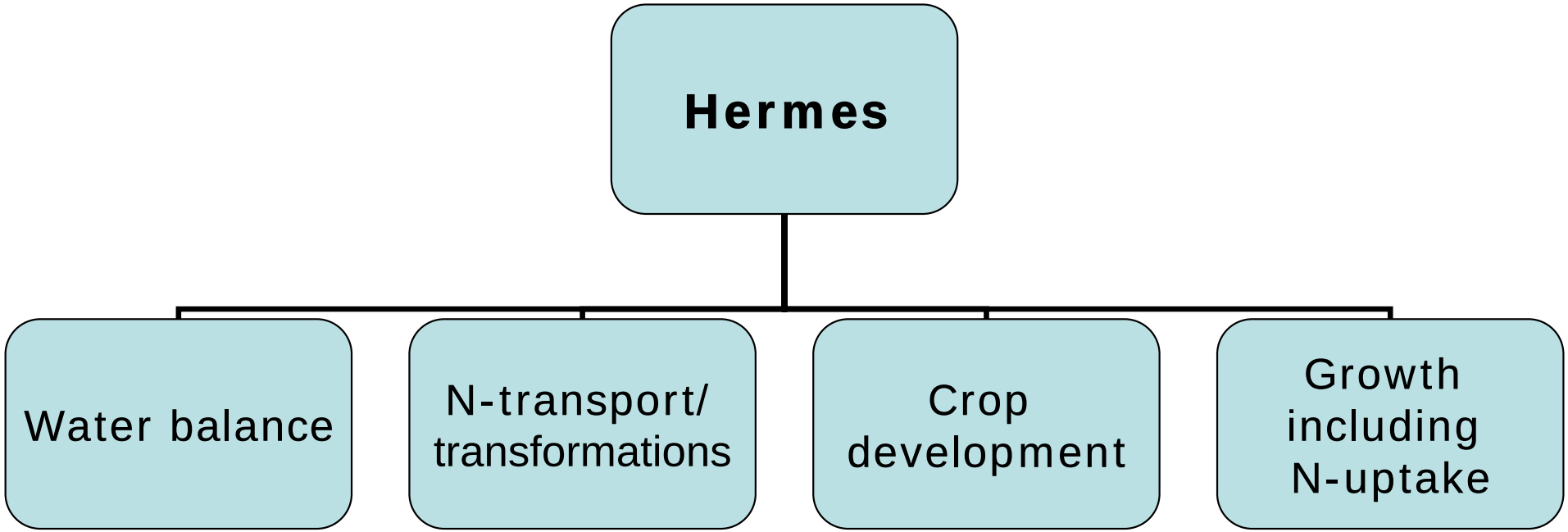
Implementation of a test run of a result-oriented AUM for species-rich grassland
(in addition to the horizontal AEM ,extensive grassland management)

Our process-oriented Model ‘Hermes’ (Kersebaum 1995)

Hermes simulates the N-leaching from the root zone.

This model requires only a limited number of usually available input data and has been validated on different scales under similar climatic and land-use conditions.

N-leaching simulation for arable land is carried out for crop rotations.



Next Steps in Brandenburg

No current official effort to implement result-oriented AEM using N-leaching figures in Brandenburg

2007 – our next steps

- Calculation the N-leaching for the new geo-referenced agricultural administrative level ‚agricultural parcel' or ‚field block' (mean size in Brandenburg 19 ha)
- Starting the discussion with the policy decision maker concerning the reduction goals for the different water sheds within the implementation of the Water Framework Directive
- Expert workshop with the responsible experts of the Brandenburg State office of environment and scientific experts about targeting AEM to meet the requirement of the Water Framework Directive (WFD)
- Development of different payment systems using N-leaching figures

Premium calculation

Based on these findings, a result-oriented premium can be designed depending on the reduction of N in kg N ha-1.

However, more variety in the management adaptations (more than three) would increase the flexibility of farmers and increase the advantages of roAEM.

In principle, the implementation could be relatively easy to realize. Of importance seems to be that the whole farm area is comprised.

Starting point could be the definition of a reference figure for N leaching at the farm level based on simulated figures under conventional production and under consideration of the legal requirements.