Industrieverband Agrar

Introduction of Generic Landscape Characteristics in Refined Aquatic Exposure and Risk Assessment for Spray-drift in Germany

- A Project of the German Crop Protection Association (IVA)

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*geo*PERA

IVA Project '*geo*PERA'
- GeoData in Probabilistic Exposure and Risk Assessment

(at present, focus on exposure of aquatic systems due to spray-drift)

Overview

1. Objectives, Background
2. Basic Concepts
3. Data & Methods
4. Preliminary Results: Vines
5. Key Characteristics

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geo*PERA – *Objectives

Principle Objective

Development of

a basis for more realistic exposure and risk assessment,

in order to derive

appropriate mitigation measures

for the use of Plant Protection Products

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geo*PERA – *Objectives

this requires,

- the identification of local environmental conditions affecting exposure,
- the identification and development of geoDatabases (geoDB) representing relevant environmental conditions in appropriate resolution,
- a landscape-based exposure assessment (EA), using appropriate models and procedures (GIS)
- the aggregation of results, to be applied in simple 'spreadsheet'-calculations, as well as in specific 'higher-tier' approaches,
- … guided by the framework of the authorisation process (co-operation of authorities, scientific institutions and companies)

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*geo*PERA – *Background*

- **Germany authorities** (UBA, BVL) intend to
  - reduce maximum authorised mitigation measures for spray-drift
  (➔ new regulation expected by end of 2006: '6th Änderungsverordnung'),
  - reduce required mitigation measures for spray-drift on the basis of more realistic ERA, as farmers seem to have problems with plant protection, (e.g., orchards),
  - simplify and harmonise mitigation measures
- **Industry** and **scientific instituts** have performed different landscape-based ERA for spray-drift, resulting in significantly lower PECsw on landscape-level than expected from the 1st-Tier scenario

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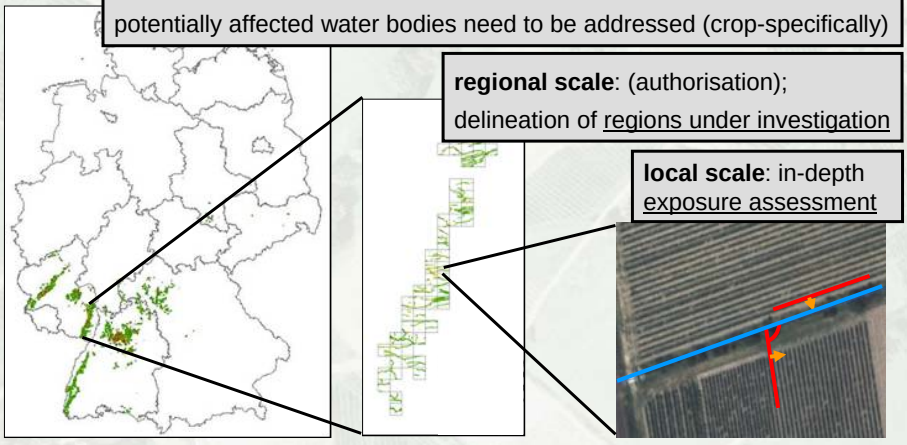
*geo*PERA – *Concepts \ scales to be taken into account*

federal scale: authorisation; in principle, potential exposure of all potentially affected water bodies need to be addressed (crop-specifically)

regional scale: (authorisation); delineation of regions under investigation

local scale: in-depth exposure assessment



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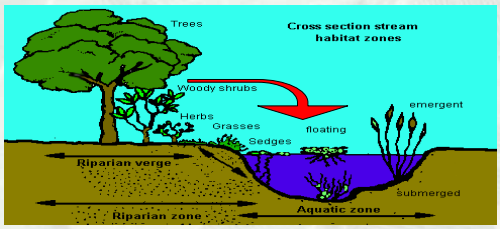
*geo*PERA – *Concepts \ local environmental conditions affecting aquatic exposure due to spray-drift*

spray-drift



field	natural buffer strip	water body
• crop type • crop development • wind speed • wind direction • row orientation	• crop-water body distance • natural buffer strip vegetation • riparian vegetation	• water body size (geometry) • water level (depth) • water flow • water plants • physical/chemical properties

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*geo*PERA – *Concepts \ local environmental conditions affecting aquatic exposure due to spray-drift*

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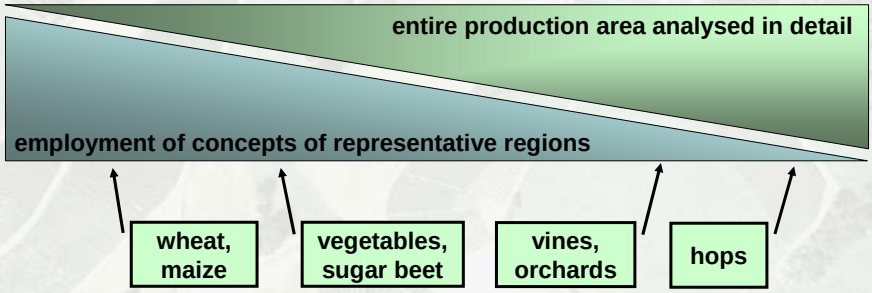
geo*PERA – *Concepts \ crop-specific employment of representativeness

Operational limitations to investigate all cultivations (resp. relevant water bodies) in high level of detail for the entire federal scale

➔ representative regions to be identified and investigated in detail

➔ crop-specific coverage of representative regions, hence, of detailed analysis



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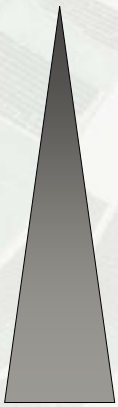
geo*PERA – *Data & Methods \ example datasets

mapping scale of data sets:



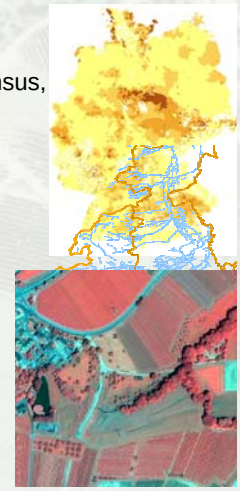
small scale:
~1:10^6 - 1:10^5

medium scale:
~1:10^4

large scale:
~1:10^3

example data sets:

- land use, e.g., CORINE, census,
- hydrological density
- weather data, e.g. MARS
- land use, hydrology: topographic DB, e.g., ATKIS
- geoMorphological Mapping
- satellite imagery (mr)
- aerial / satellite imagery (hr)
- field observations



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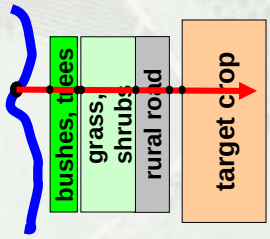
geo*PERA – *Data & Methods \ methods \ aquatic systems, spray-drift

Summary

- definition of relevant water body 'set' (e.g., within 150 m distance from crop)
- analysis of conditions in the surrounding of water body segments (distance) (e.g., 5-20 m length) in each of 8 directions (potential wind directions)
- spray-drift deposition calculated using the 90th percentile Rautmann (BBA) rates
- spray-drift filtering of vegetation can be taken into account
- at present, simple and conservative water body characteristics applied (static, 30 cm deep, no plants)

90th percentile of local PECsw is used in the aquatic Risk Assessment



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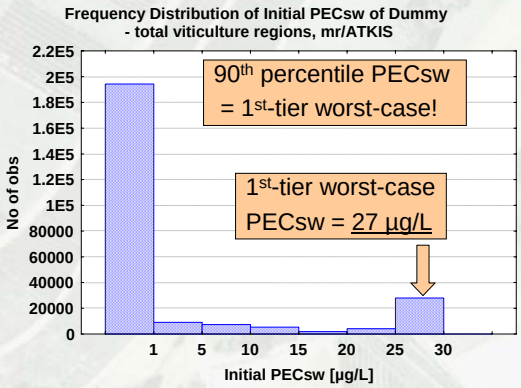
geo*PERA – *vines \ preliminary results, aquatic systems, spray-drift

Initial PECsw of a *dummy*, of almost the total relevant water body set – based on local distance using ATKIS (medium-scale / -resolution, 'mr')



high number of worst-case PECsw is an artefact, due to resolution limitations and generalisation of ATKIS

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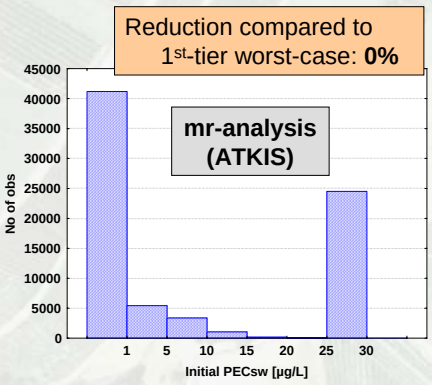
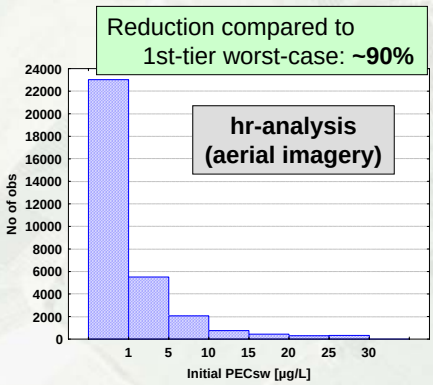
geo*PERA – *vines \ preliminary results, spray-drift

Viticulture region 'Vorderpfalz': ➔ insufficient representation of local co-occurence in medium resolution (mr) ➔ high-resolution (hr) -analysis





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geo*PERA – *vines \ summary on preliminary results – reduction rates

Viticulture Region	WB length [km]	medium resolution	high resolution	Remark
Franken	159	**99%**	-	hr-analysis principally not necessary
Württemberg	405	**95%**	-	hr-analysis principally not necessary
Baden	464	**97%**	-	hr-analysis principally not necessary
Nahe	139	**93%**	-	hr-analysis principally not necessary
Mittelrhein	48	**95%**	-	hr-analysis principally not necessary
Vorderpfalz	340	**0%**	**>90%**	hr-analysis in relevant sub region
Rheinhessen	338	**0%**	ongoing	hr-analysis in relevant sub region
Ahr	12	**0%**	-	field observation: potentially critical wb segments could not be confirmed
Mosel-Saar-Ruwer	405	**0%**	to be examined	particular conditions due to very steep vineyards ➔ specific investigation

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geo*PERA – *vines \ preliminary conclusions on mitigation measures

On the basis of the preliminary results obtained for vines on federal scale,
the following effects on mitigation measures are currently assumed achievable

Product	Mitigation (Buffer) Requirement Based on 1st-Tier EA	➔ Proposed Mitigation Resulting from Landscape-based EA
A	**up to 15 m**	**➔ no additional buffer required**
B	**20 m**	**➔ 5 m**
C	**20 m + 75% drift reduction**	**➔ 15 m + 0% red.** **➔ 10 m + 50% red.** **➔ 5 m + 75% red.**
D	**20 m + 90% drift reduction**	**➔ 15 m + 50% red.** **➔ 10 m + 75% red.** **➔ 5 m + 90% red.**

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geo*PERA – *key characteristics

1. detailed landscape-analysis in representative regions (RUI, and sub regions)
2. detailed analysis by combination of medium- and high-resolution analysis
3. outcome
   - generic adaption rates, ready to be applied on federal scale (e.g., vines: 0.07)

     PECsw_2nd-tier = PECsw_1st-tier • *adaptionFactor_vines*
   - geoDatabases on relevant local environmental conditions, tools
   - generic investigation of spatial concentration of 'upper 10%' cases ('clusters')
4. installation of an independent service provider
   - generic outcome, e.g., adaption rates
   - geoDatabases on relevant local environmental conditions, tools
   - documentation, concept papers, etc.

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Thank you very much for your kind attention.

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