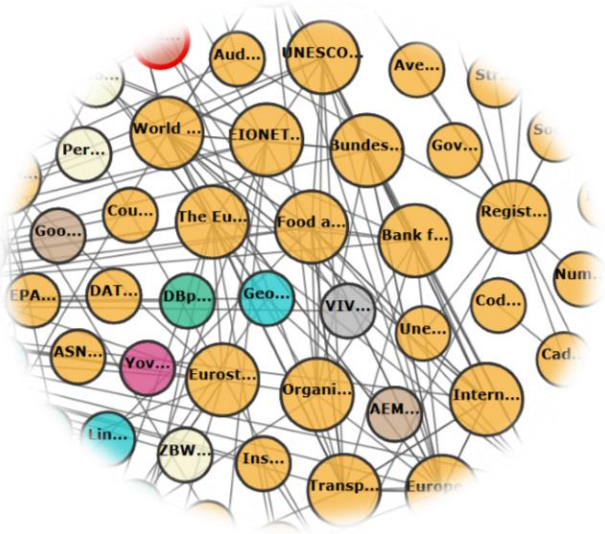

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Federal Research Centre for Cultivated Plants

SYNOPS a pesticide risk indicator model to assess environmental risk – contribution to and benefits of LOD

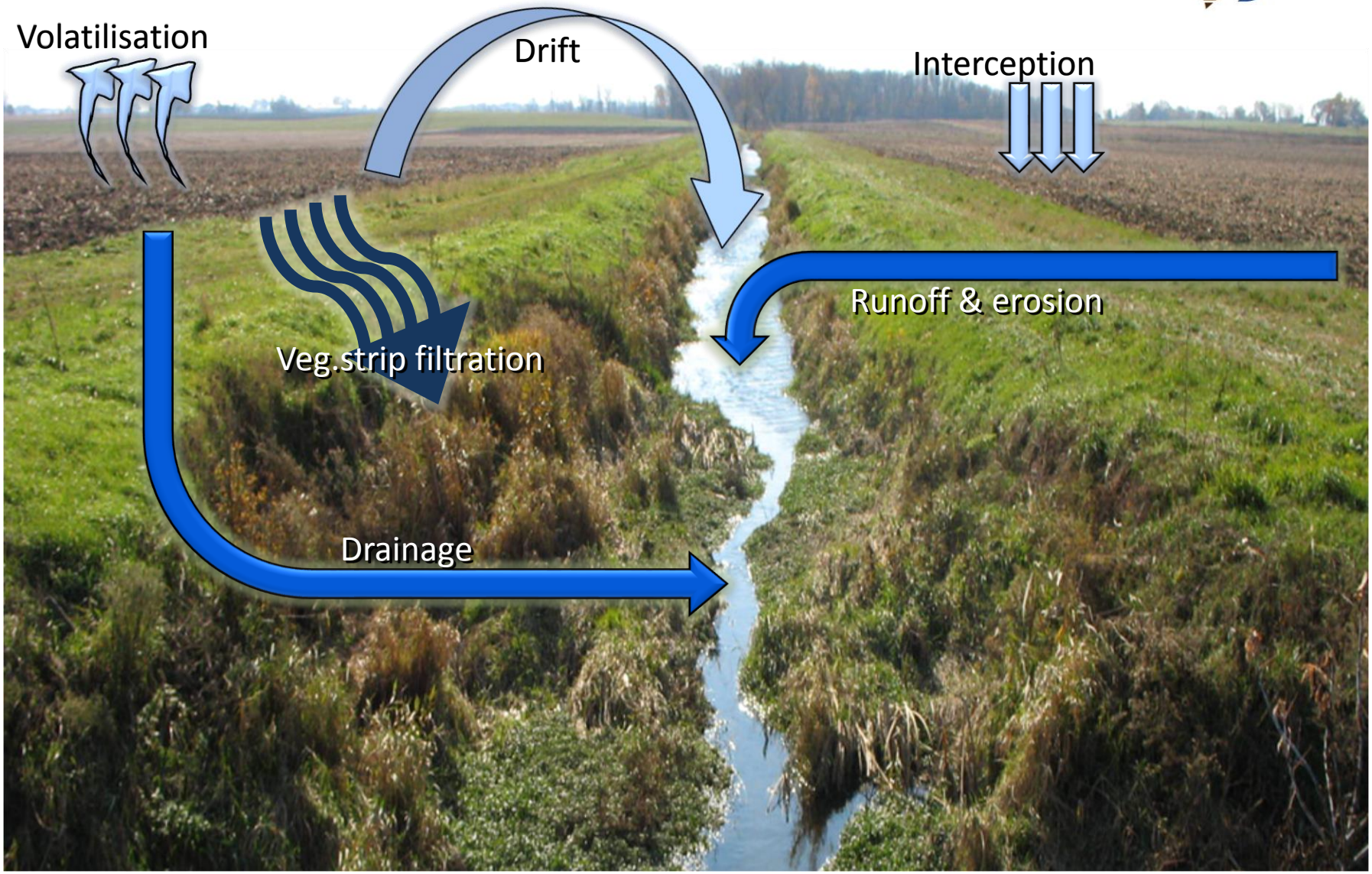
Strassemeyer J.[1], Dominic A.R.[1], Tecklenburg J.[1] Daehmlow D.[1], Horney P. [1], Claus A.[2], Böhmer J.[2], Golla B.[1]

[1] Institute for Strategies and Technology Assessment, Julius Kühn-Institute (JKI), Kleinmachnow, Germany
[2] Chamber of Agriculture in North-Rhine Westphalia, Plant Protection Service, Germany

SYNOPS – environmental risk assessment tool

- a model system for **quantitative assessment of risk potential of pesticides** for the environment
- estimates risk to various reference **organisms in soil, water and field margins**
- developed by Julius Kühn-Institute (JKI) in 1997
- applications:
  - EU-level assessments and as OECD indicator
  - various EU-member-states for risk management
  - at regional levels (federal states) and specific catchment levels

SYNOPS – exposure pathways



SYNOPS – models

JSON

SYNOPS - core

drift
mod. Ganzelmeier fns.

drainage
MACRO meta model

edge of field runoff

filter strip
VFSMOD

runoff & erosion
PRZM

soil concentration 0-2cm

JSON

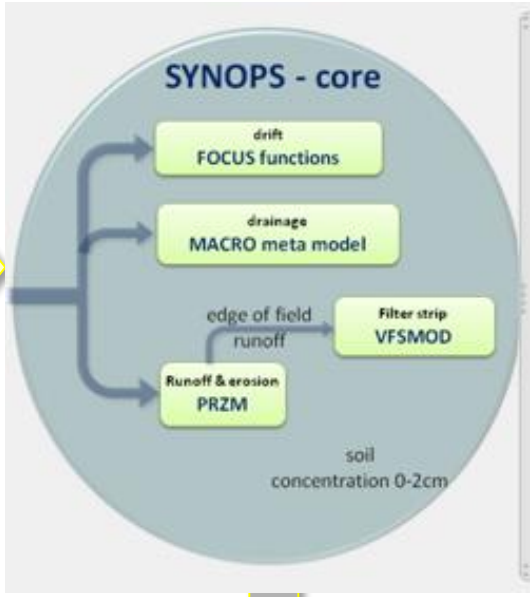
field margins

surface water

soil

SYNOPS – schema

- topographical information **(InVeKos/ATKIS)**
- crop parameters **(EU-FOCUS scenarios/DWD)**
- weather parameters **(DWD)**
- Soil properties **(BÜK1000/BK50)**
- surface water type, distance **(ATKIS/GSK3C)**
- chemical properties **(PPDB/BVL)**

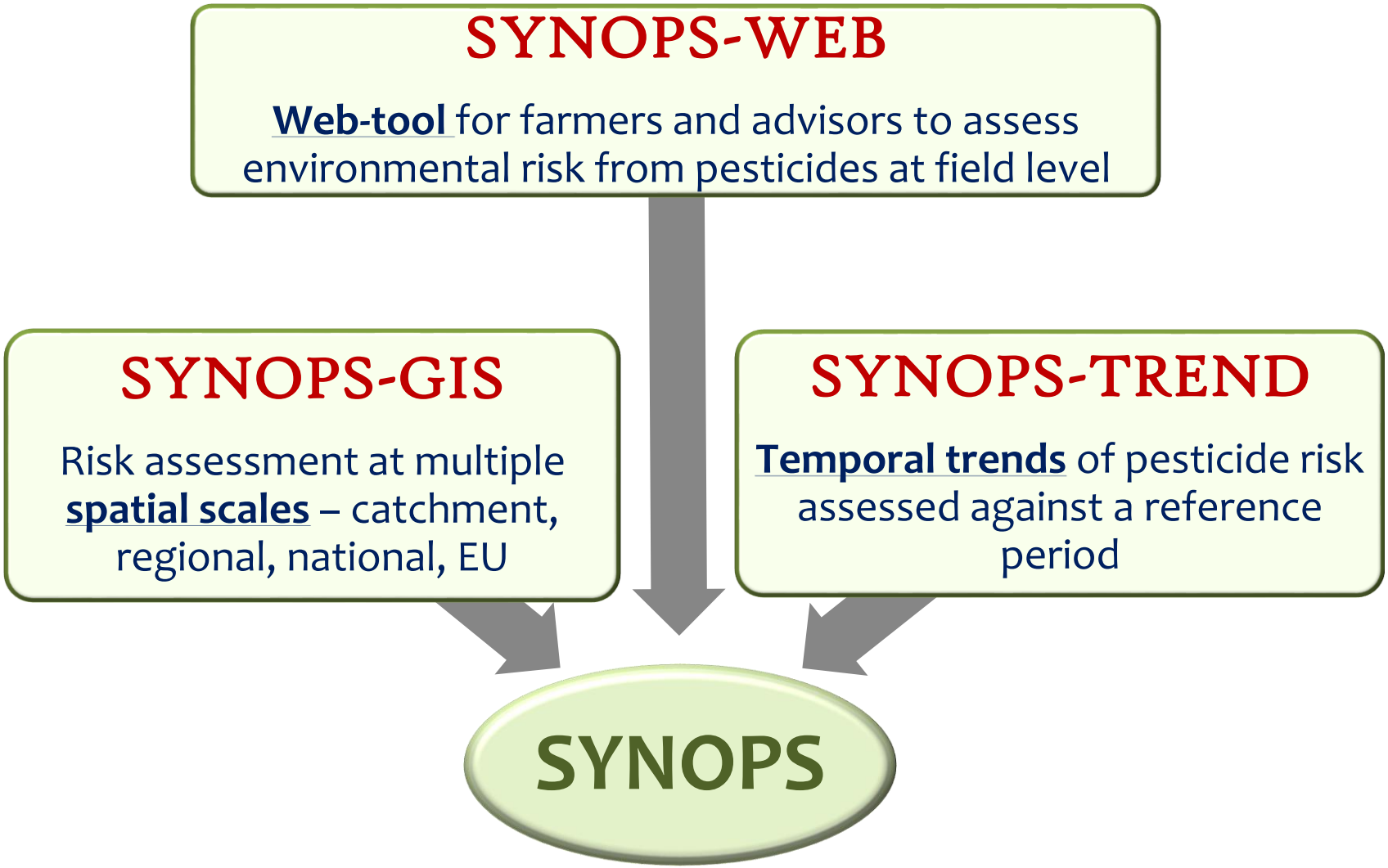


Toxicity for reference organisms (LC_{50} & NOEC)

exposure

$$ETR = \frac{exposure\ (PEC)}{toxicity\ (NOEC\ ,\ LC_{50})}$$

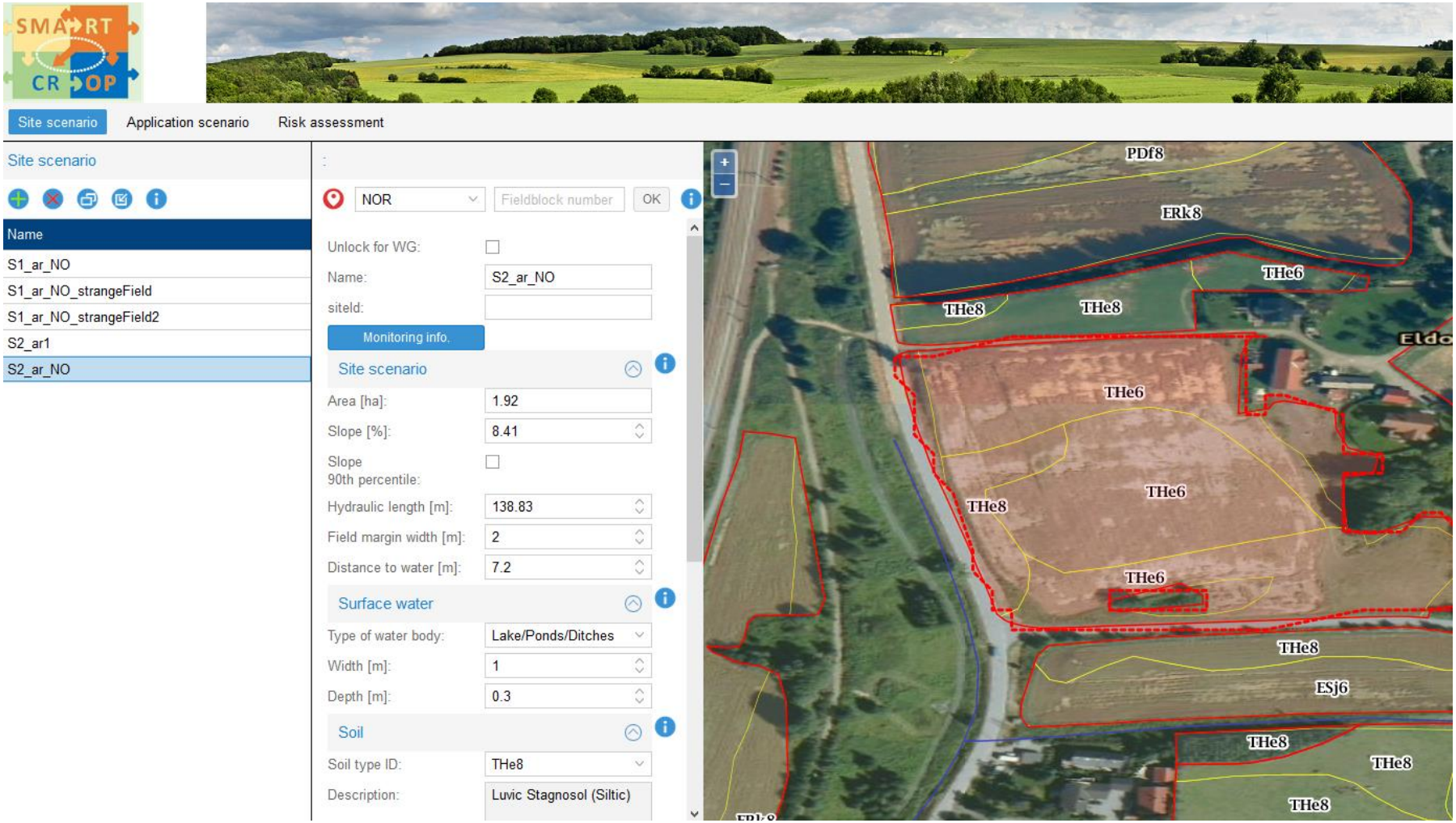
SYNOPS – 3 flavours



SYNOPS-WEB – step 1

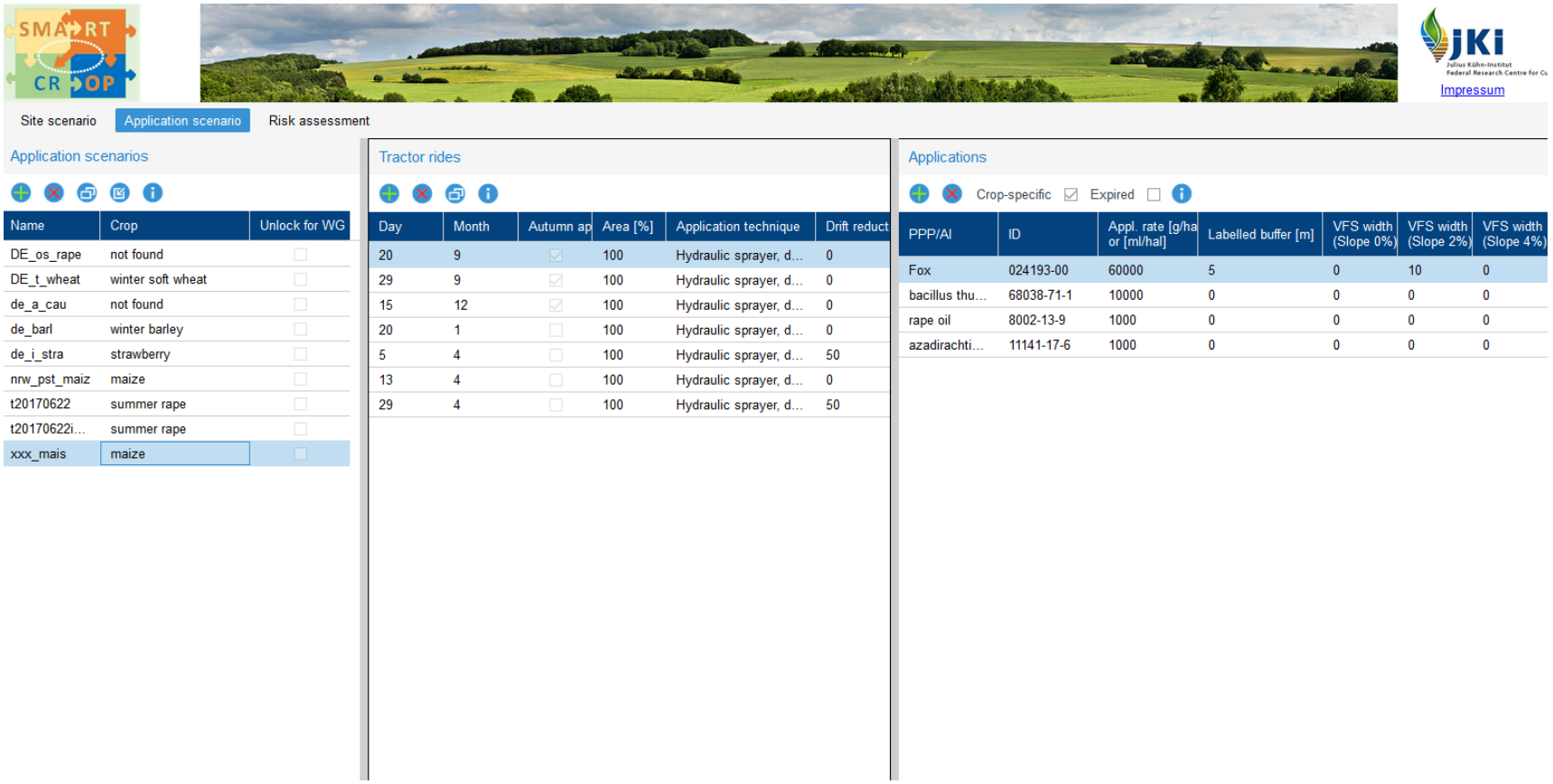
Easy-to-use interface, aimed at non-expert user

http://synops.julius-kuehn.de/

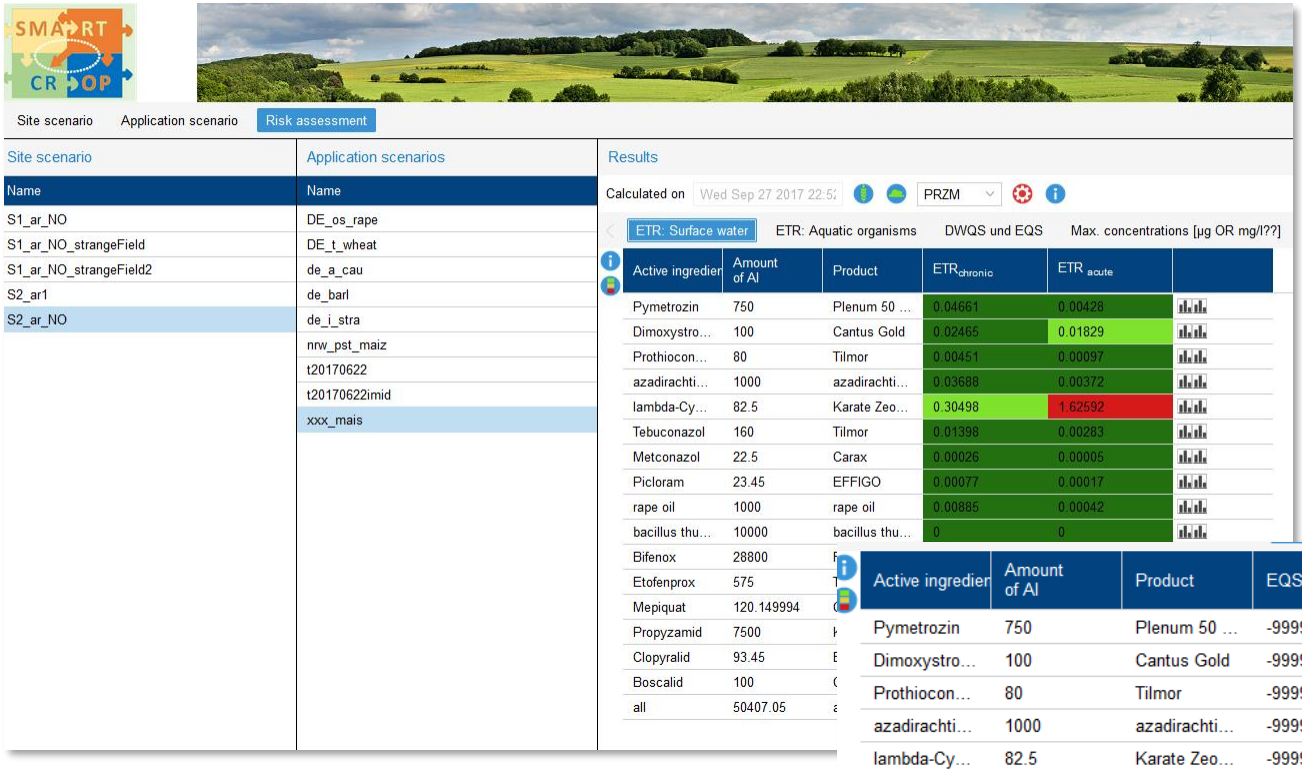


SYNOPS-WEB – step 2

Easy-to-use interface, aimed at non-expert user

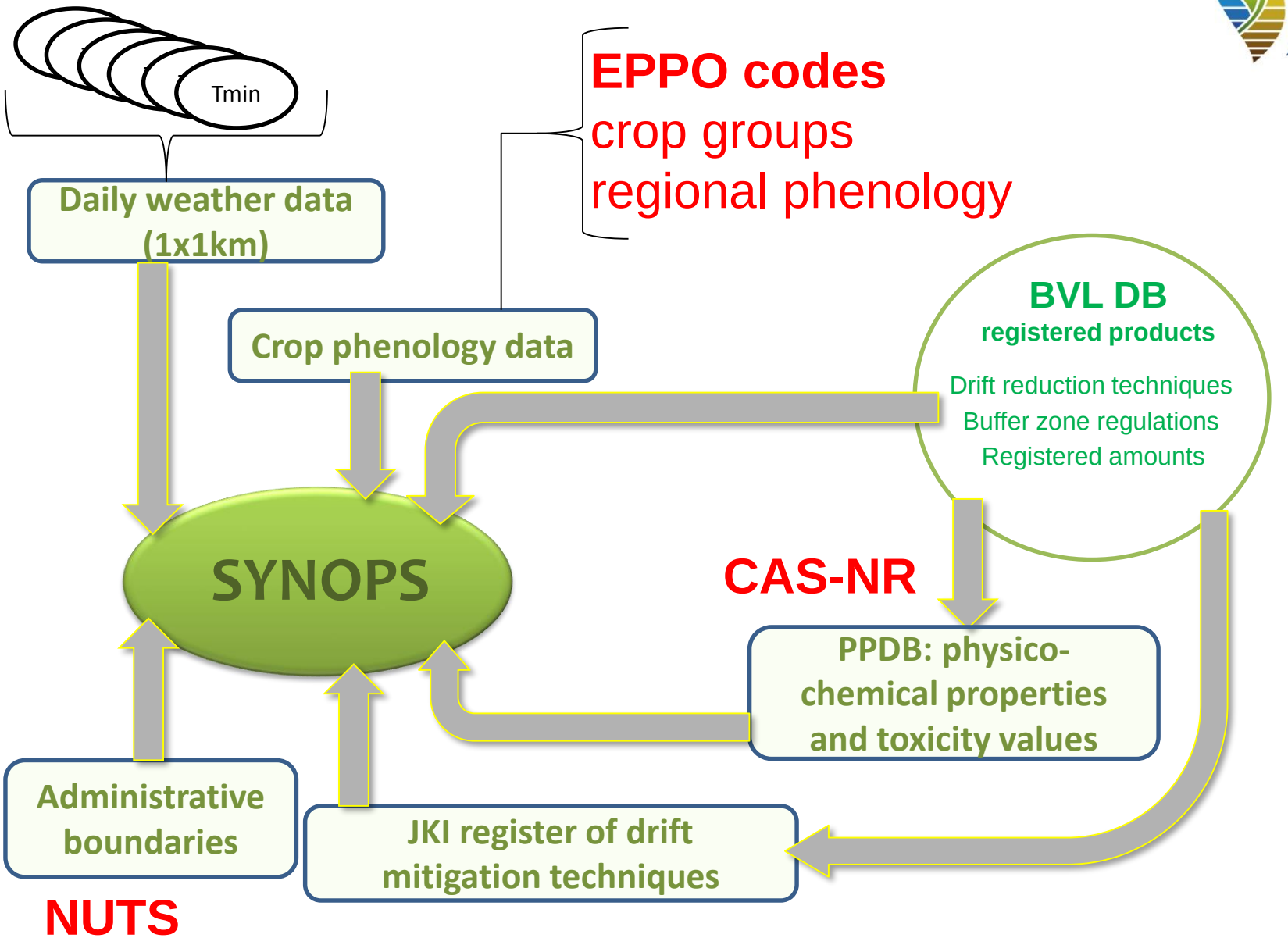


SYNOPS-WEB – step 3



Active ingredien	Amount of AI	Product	EQS	EQS exceeden	DWQS	DWQS exceed
Pymetrozin	750	Plenum 50 ...	-9999	NA	-9999	NA
Dimoxystro...	100	Cantus Gold	-9999	NA	-9999	NA
Prothiocon...	80	Tilmor	-9999	NA	-9999	NA
azadirachti...	1000	azadirachti...	-9999	NA	-9999	NA
lambda-Cy...	82.5	Karate Zeo...	-9999	NA	-9999	NA
Tebuconazol	160	Tilmor	0.001	0	0.0001	+
Metconazol	22.5	Carax	-9999	NA	-9999	NA
Picloram	23.45	EFFIGO	-9999	NA	-9999	NA
rape oil	1000	rape oil	-9999	NA	-9999	NA
bacillus thu...	10000	bacillus thu...	-9999	NA	-9999	NA
Bifenox	28800	Fox	0.00001	+++	0.0001	+++
Etofenprox	575	Trebon 30 EC	-9999	NA	-9999	NA
Mepiquat	120.149994	Carax	-9999	NA	-9999	NA
Propyzamid	7500	Kerb FLO	0.0001	+++	0.0001	+++
Clopyralid	93.45	EFFIGO	0.0001	+++	0.0001	+++
Boscalid	100	Cantus Gold	0.0001	0	0.0001	0
all	50407.05	all PPPs		+++		+++

How SYNOPS can benefit from LOD...



SYNOPS-WEB – outputs as LOD?

- Too field/farmer specific, the farmer would not want to make it open
- Many fictional simulations are possible and hence not reliable or useful for further analysis
- Not much potential for providing it as open data

SYNOPS-GIS

- aimed at non-expert user
- calculations at field-level, results aggregated at various spatial scales
- spatial scales – **catchment, growing regions, district, federal states, national(?)**
- 1.5 million fields for Germany
  - Different possible crop combinations – exact crop location is not known
  - Many randomised application scenarios

SYNOPS-GIS - outputs

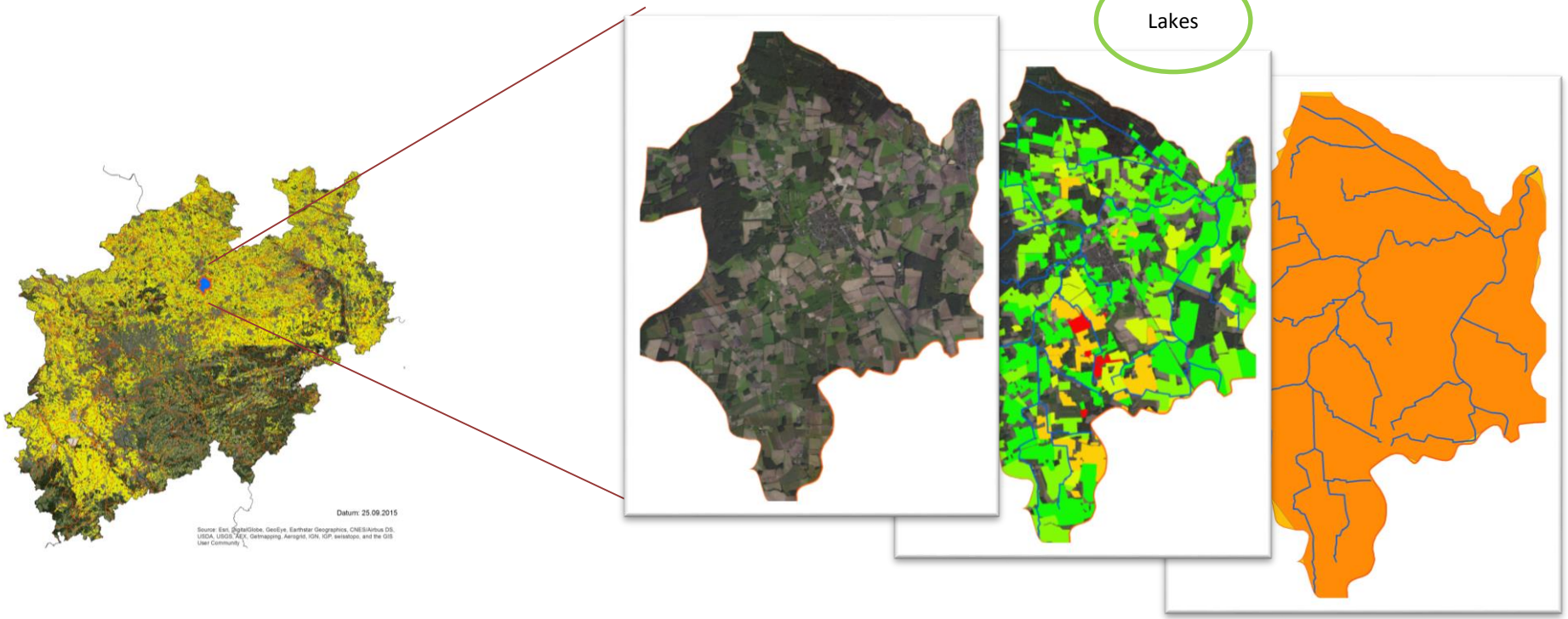
ETR from SYNOPS

Administrative boundaries

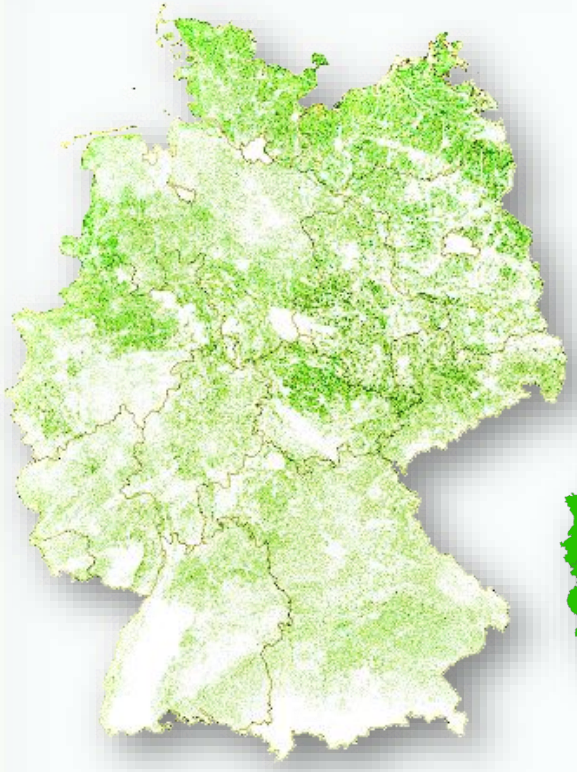
- Country
- State
- District

Natural boundaries

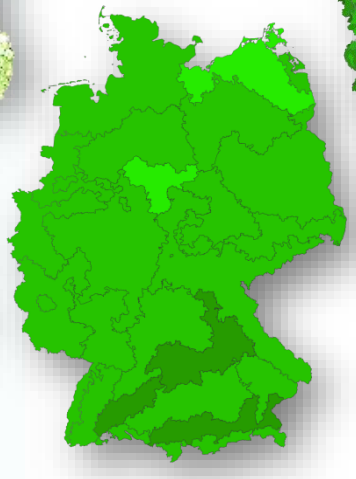
- Soil-climate regions
- Catchment
- Lakes

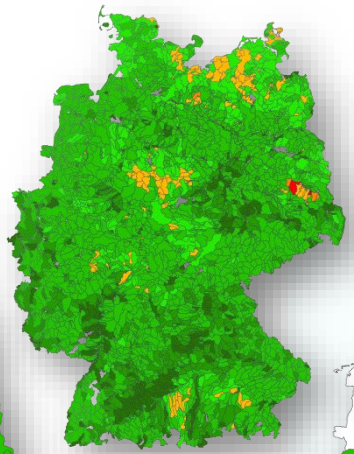


SYNOPS-GIS - outputs



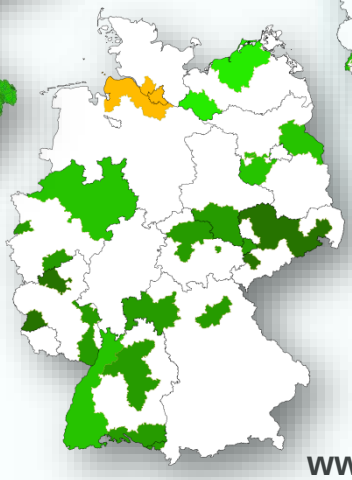
Soil-climate zones



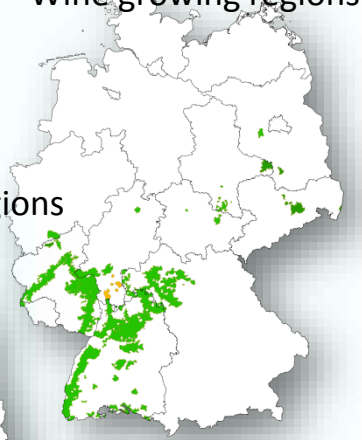


Catchments

Fruit-growing regions



Wine growing regions



SYNOPS-GIS - outputs

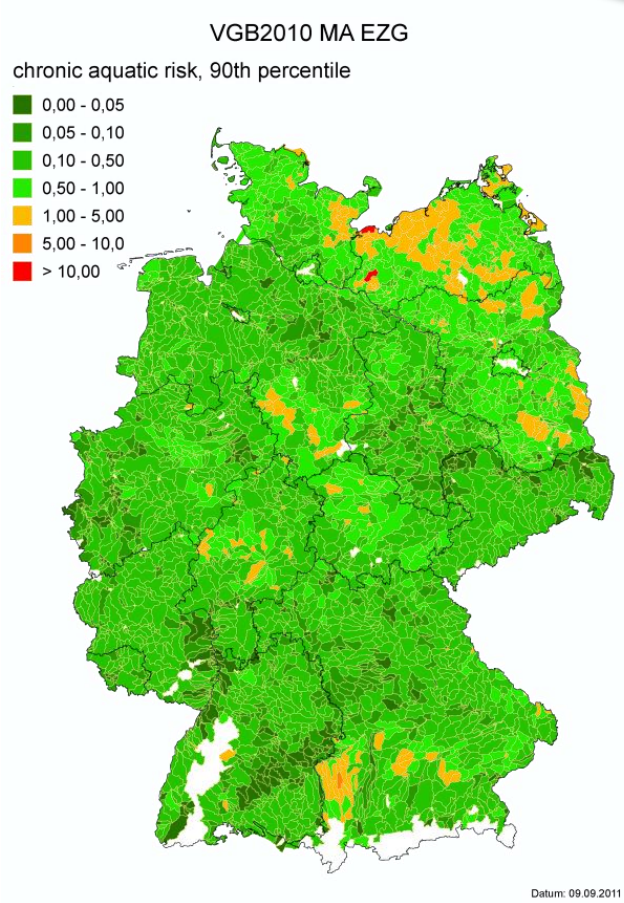
ETR from SYNOPS

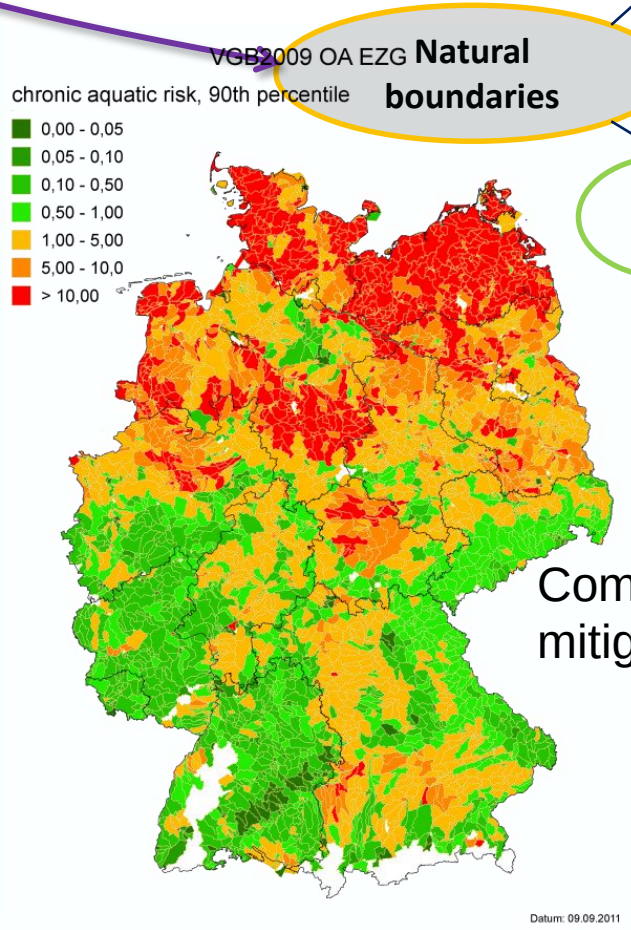
Administrative boundaries

- Country
- State
- District

Natural boundaries

- Soil-climate regions
- Catchment
- Lakes





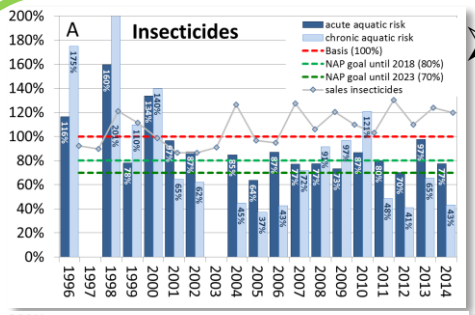
Comparative analysis of mitigation measures

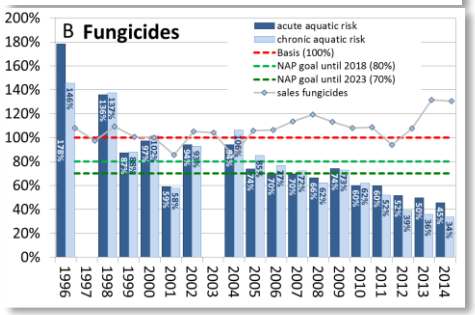
SYNOPS-TREND

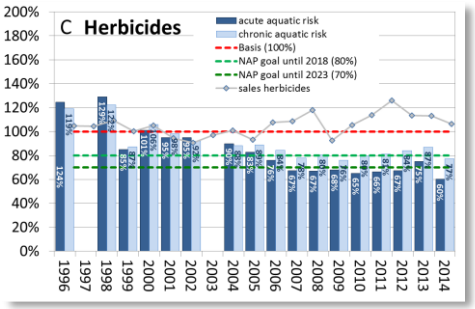
reference period

year
1996
1998
1999
2000
2001
2002
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014

- Current year's risk compared against a reference period (1995-2005) at **national** level.
- Aggregation levels:
  - herbicide, fungicide, insecticide
  - Surface water, soil, field margins
  - Chemicals/ active ingredients



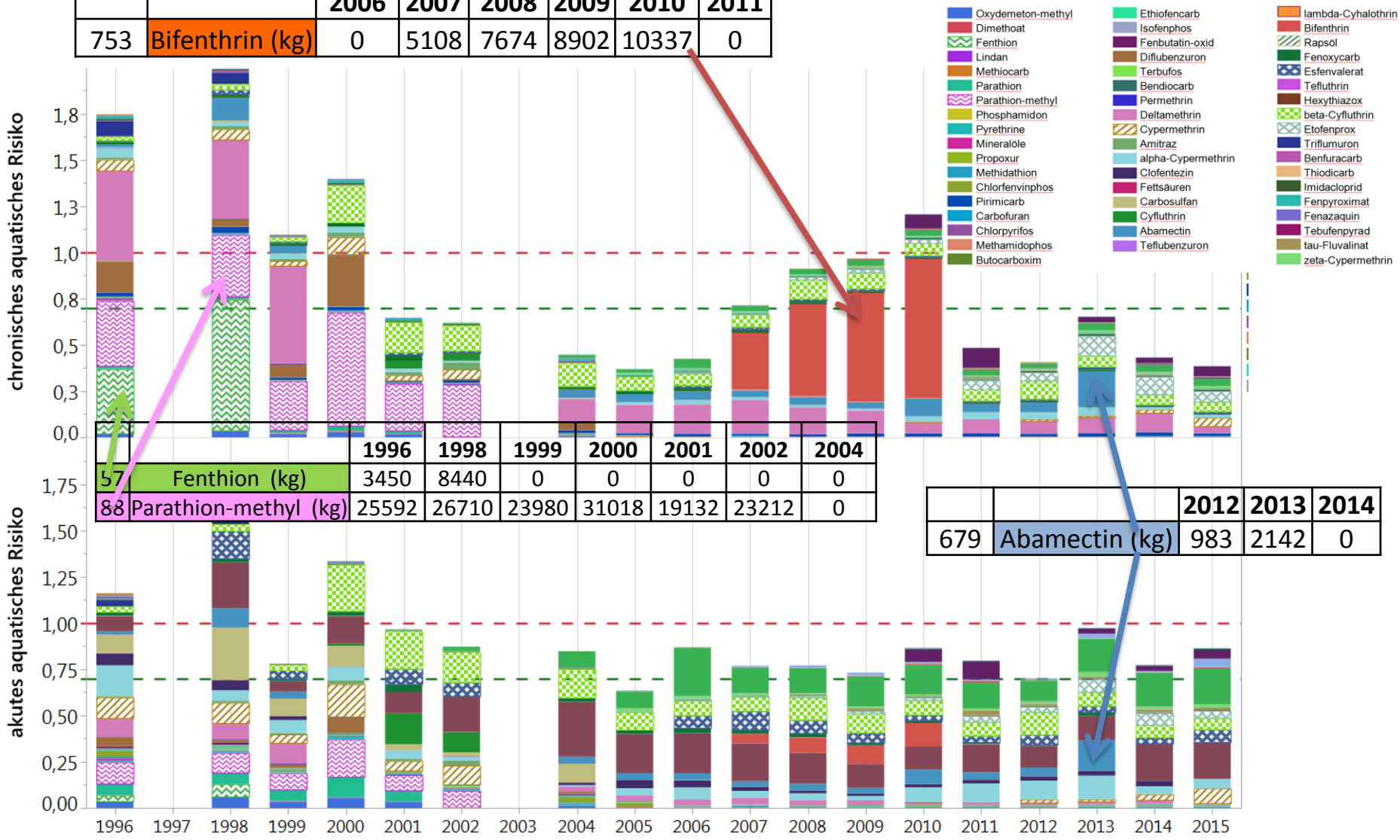




- 2018 , 20 % risk reduction for all three a.i. groups (exception: acute risk of insecticides 14%)

SYNOPS-TREND

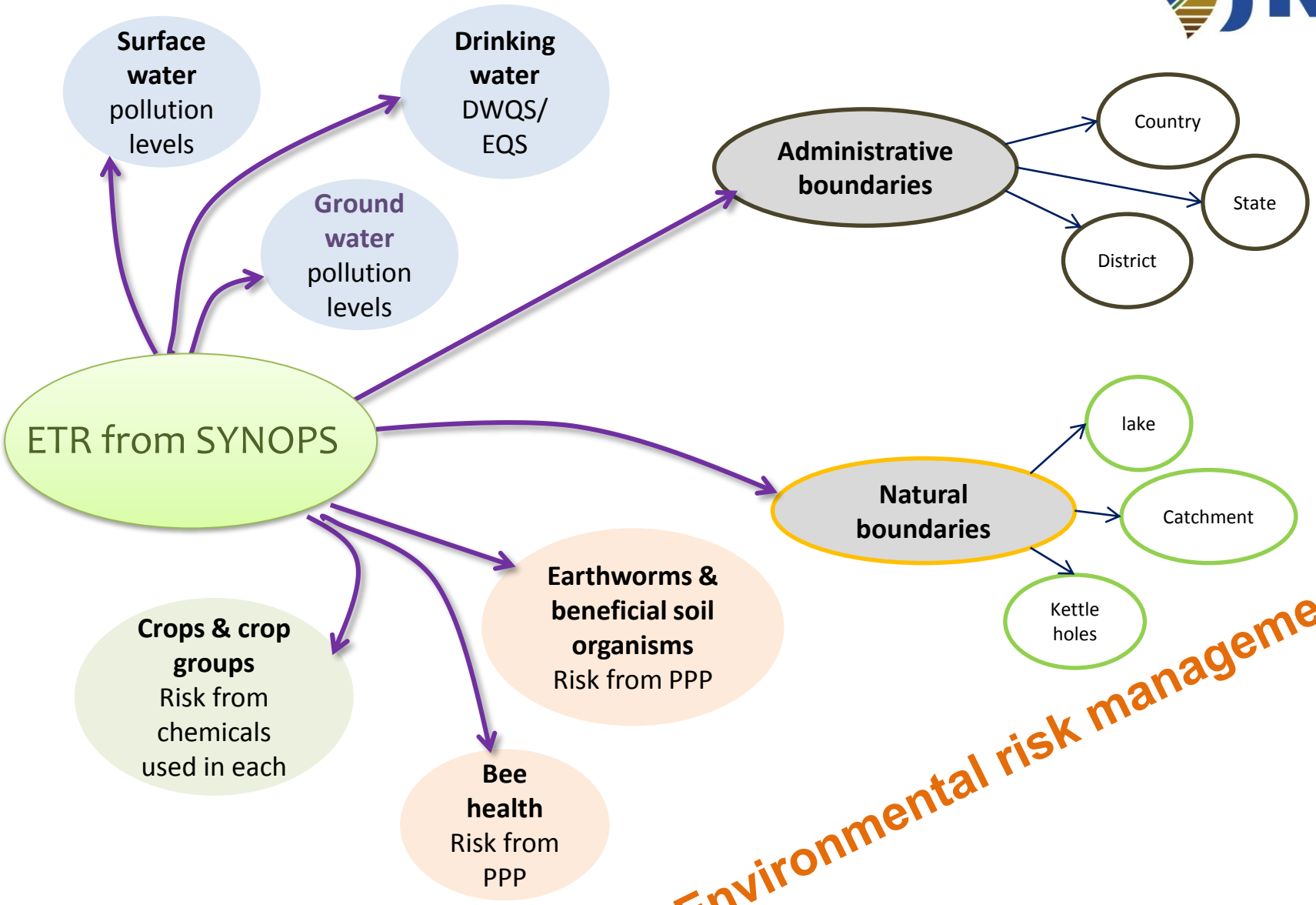
		2006	2007	2008	2009	2010	2011
753	Bifenthrin (kg)	0	5108	7674	8902	10337	0



		1996	1998	1999	2000	2001	2002	2004
57	Fenthion (kg)	3450	8440	0	0	0	0	0
88	Parathion-methyl (kg)	25592	26710	23980	31018	19132	23212	0

		2012	2013	2014
679	Abamectin (kg)	983	2142	0

How SYNOPS can contribute to LOD...



Thank you for your attention!