

# SYNOPS a pesticide risk indicator model to assess environmental risk

## – contribution to and benefits of LOD

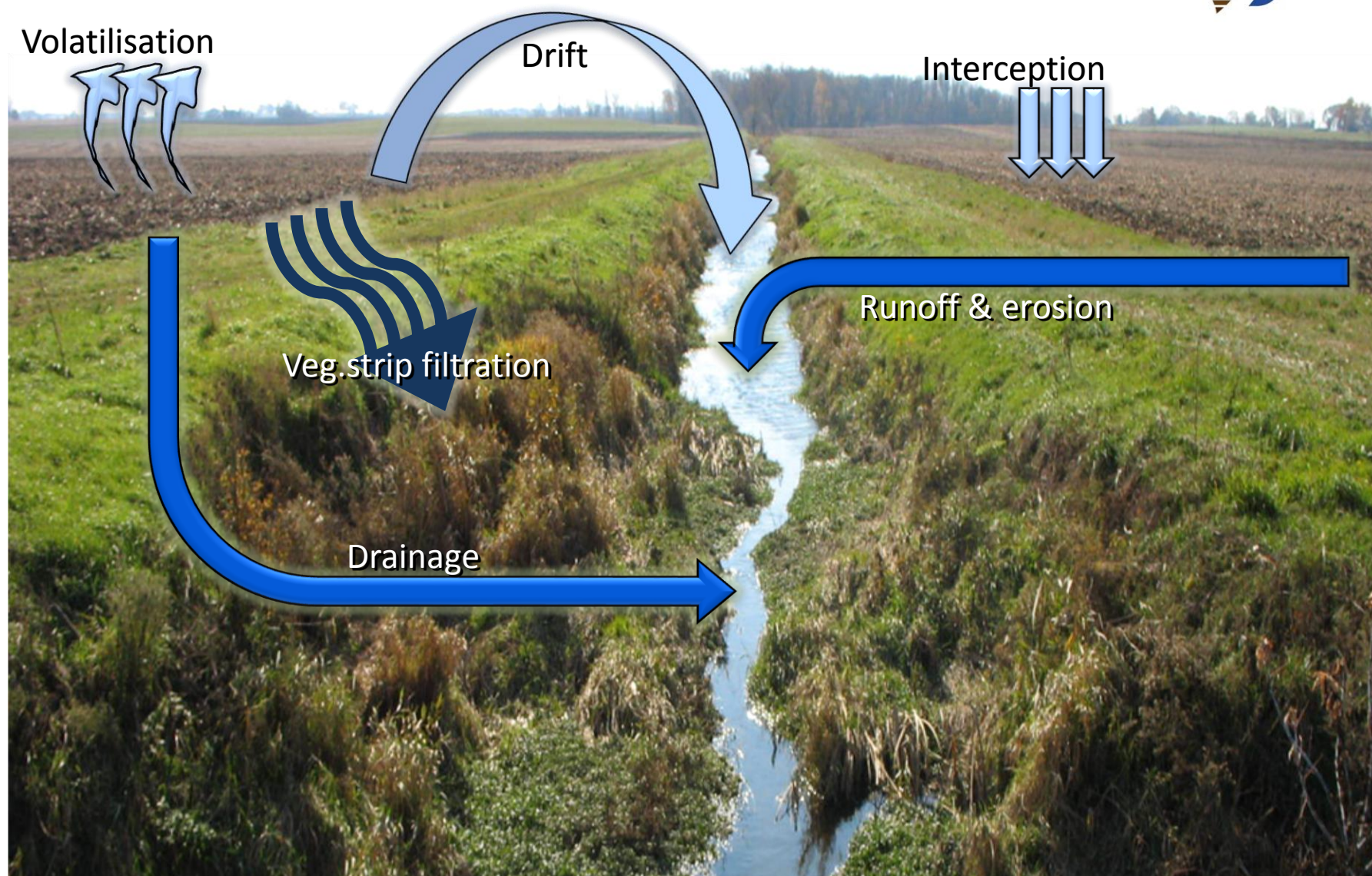
Strassemeyer J.<sup>1</sup>, Dominic A.R.<sup>1</sup>, Tecklenburg J.<sup>1</sup>, Daehmlow D.<sup>1</sup>, Horney P.<sup>1</sup>, Claus A.<sup>2</sup>, Böhmer J.<sup>2</sup>, Golla B.<sup>1</sup>

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<sup>2</sup> Chamber of Agriculture in North-Rhine Westphalia, Plant Protection Service, Germany

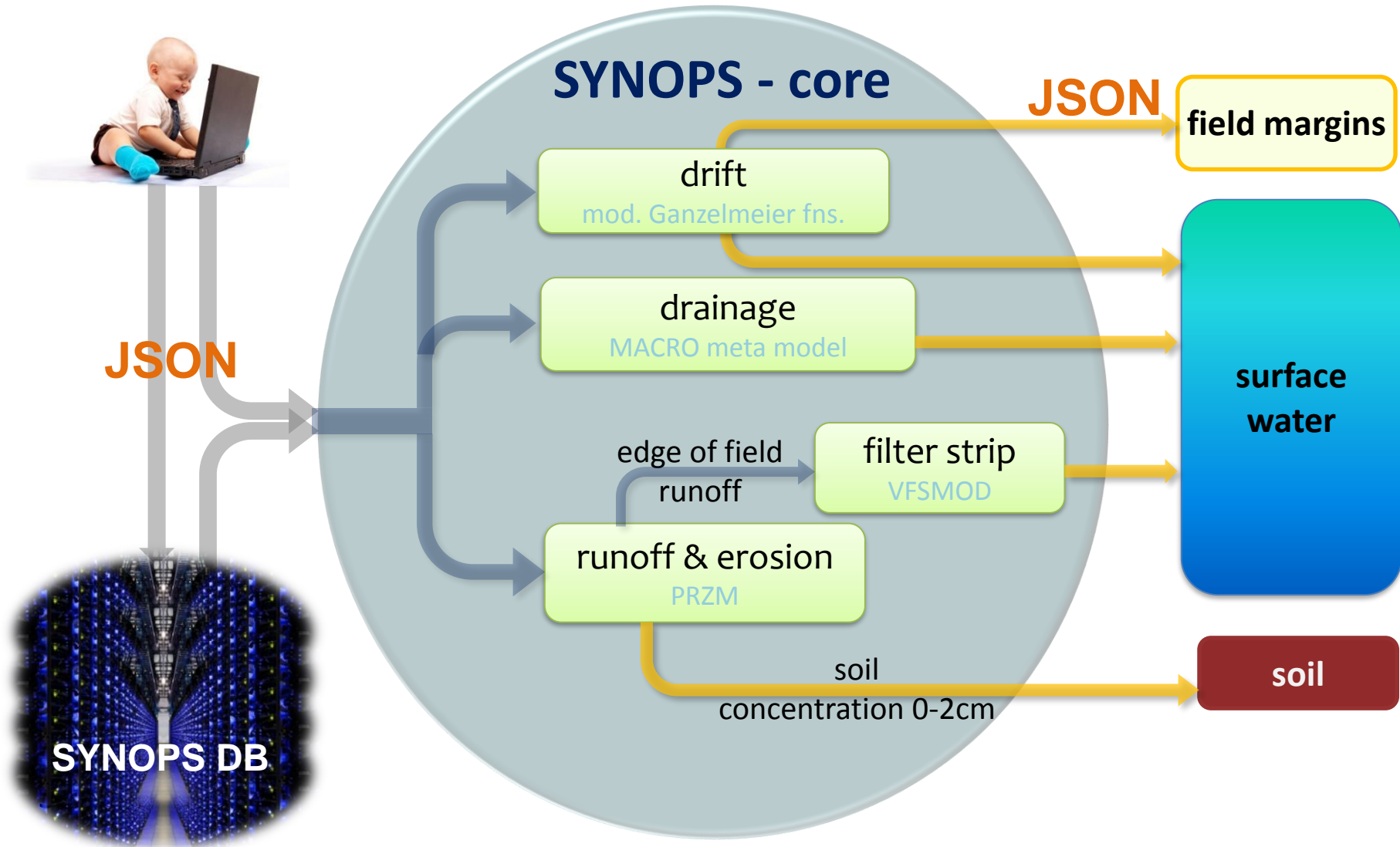
- a model system for **quantitative assessment of risk potential of pesticides** for the environment
- estimates risk to various reference **organisms in soil, water and field margins**
- developed by Julius Kühn-Institute (JKI) in 1997
- applications:
  - EU-level assessments and as OECD indicator
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

# SYNOPS – exposure pathways

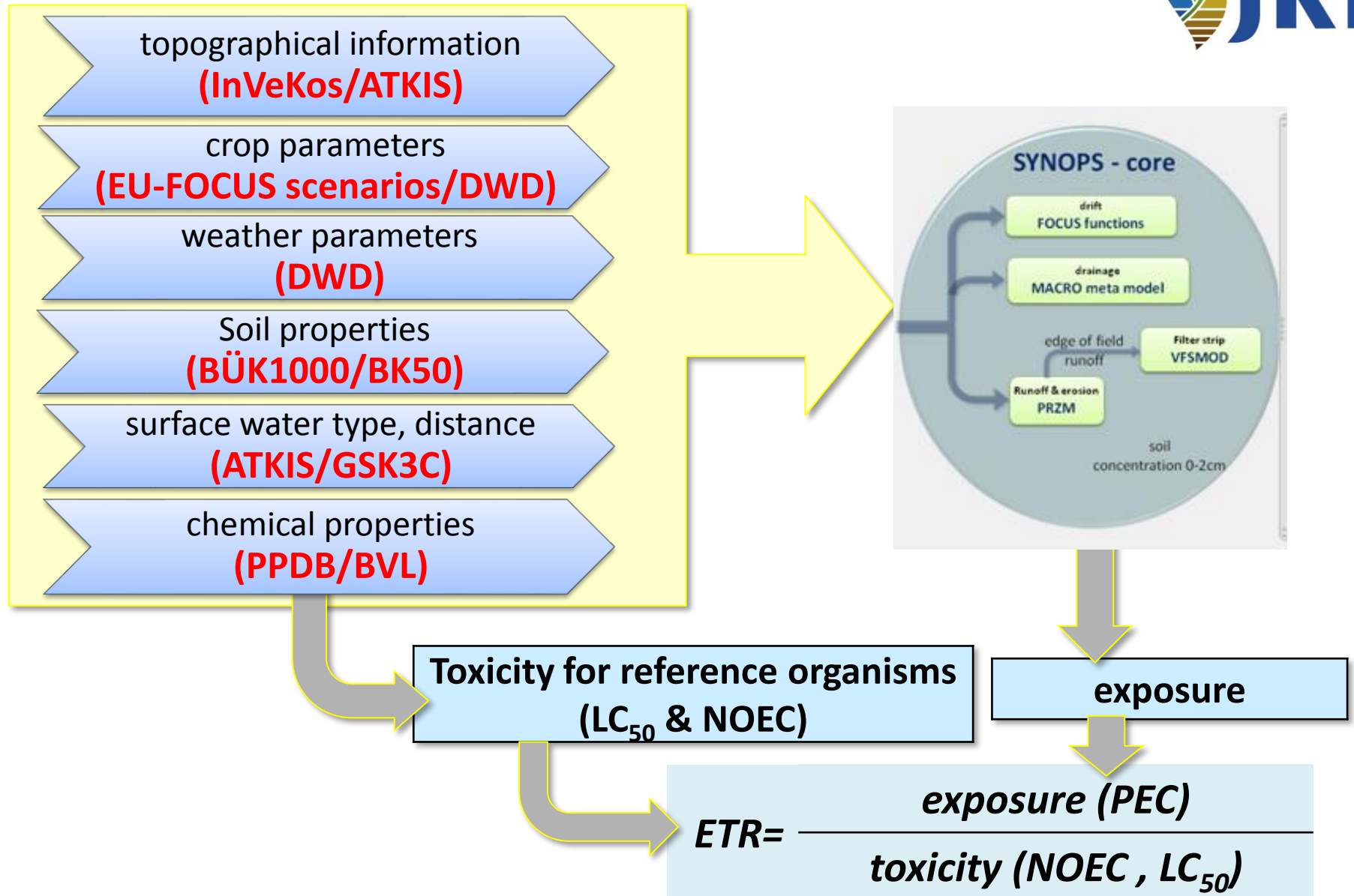




# SYNOPS – models



# SYNOPS – schema



# SYNOPS – 3 flavours



## SYNOPS-WEB

Web-tool for farmers and advisors to assess environmental risk from pesticides at field level

## SYNOPS-GIS

Risk assessment at multiple spatial scales – catchment, regional, national, EU

## SYNOPS-TREND

Temporal trends of pesticide risk assessed against a reference period

**SYNOPS**

# SYNOPS-WEB – step 1



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

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



Site scenario

Application scenario

Risk assessment

Site scenario

+

✕

📄

📧

ℹ️

Name

S1\_ar\_NO

S1\_ar\_NO\_strangeField

S1\_ar\_NO\_strangeField2

S2\_ar1

S2\_ar\_NO

📍

NOR

Fieldblock number

OK

ℹ️

Unlock for WG:

☐

Name:

S2\_ar\_NO

siteld:

Monitoring info.

Site scenario

Area [ha]:

1.92

Slope [%]:

8.41

Slope 90th percentile:

☐

Hydraulic length [m]:

138.83

Field margin width [m]:

2

Distance to water [m]:

7.2

Surface water

Type of water body:

Lake/Ponds/Ditches

Width [m]:

1

Depth [m]:

0.3

Soil

Soil type ID:

THe8

Description:

Luvic Stagnosol (Siltic)

+

-

# SYNOPS-WEB – step 2



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



Site scenario Application scenario Risk assessment

Application scenarios

Application scenarios table:

Name	Crop	Unlock for WG
DE_os_rape	not found	<input type="checkbox"/>
DE_t_wheat	winter soft wheat	<input type="checkbox"/>
de_a_cau	not found	<input type="checkbox"/>
de_barl	winter barley	<input type="checkbox"/>
de_i_stra	strawberry	<input type="checkbox"/>
nrv_pst_maiz	maize	<input type="checkbox"/>
t20170622	summer rape	<input type="checkbox"/>
t20170622i...	summer rape	<input type="checkbox"/>
xxx_mais	maize	<input type="checkbox"/>

Tractor rides

Day	Month	Autumn ap	Area [%]	Application technique	Drift reduct
20	9	<input checked="" type="checkbox"/>	100	Hydraulic sprayer, d...	0
29	9	<input checked="" type="checkbox"/>	100	Hydraulic sprayer, d...	0
15	12	<input checked="" type="checkbox"/>	100	Hydraulic sprayer, d...	0
20	1	<input type="checkbox"/>	100	Hydraulic sprayer, d...	0
5	4	<input type="checkbox"/>	100	Hydraulic sprayer, d...	50
13	4	<input type="checkbox"/>	100	Hydraulic sprayer, d...	0
29	4	<input type="checkbox"/>	100	Hydraulic sprayer, d...	50

Applications

Applications table:

PPP/AI	ID	Appl. rate [g/ha or [ml/ha]	Labelled buffer [m]	VFS width (Slope 0%)	VFS width (Slope 2%)	VFS width (Slope 4%)
Fox	024193-00	60000	5	0	10	0
bacillus thu...	68038-71-1	10000	0	0	0	0
rape oil	8002-13-9	1000	0	0	0	0
azadiracti...	11141-17-6	1000	0	0	0	0



# SYNOPS-WEB – step 3



Site scenario Application scenario Risk assessment

Site scenario	Application scenarios
Name	Name
S1_ar_NO	DE_os_rape
S1_ar_NO_strangeField	DE_t_wheat
S1_ar_NO_strangeField2	de_a_cau
S2_ar1	de_barl
S2_ar_NO	de_i_stra
	nvw_pst_maiz
	t20170622
	t20170622imid
	xxx_mais

## Results

Calculated on Wed Sep 27 2017 22:57

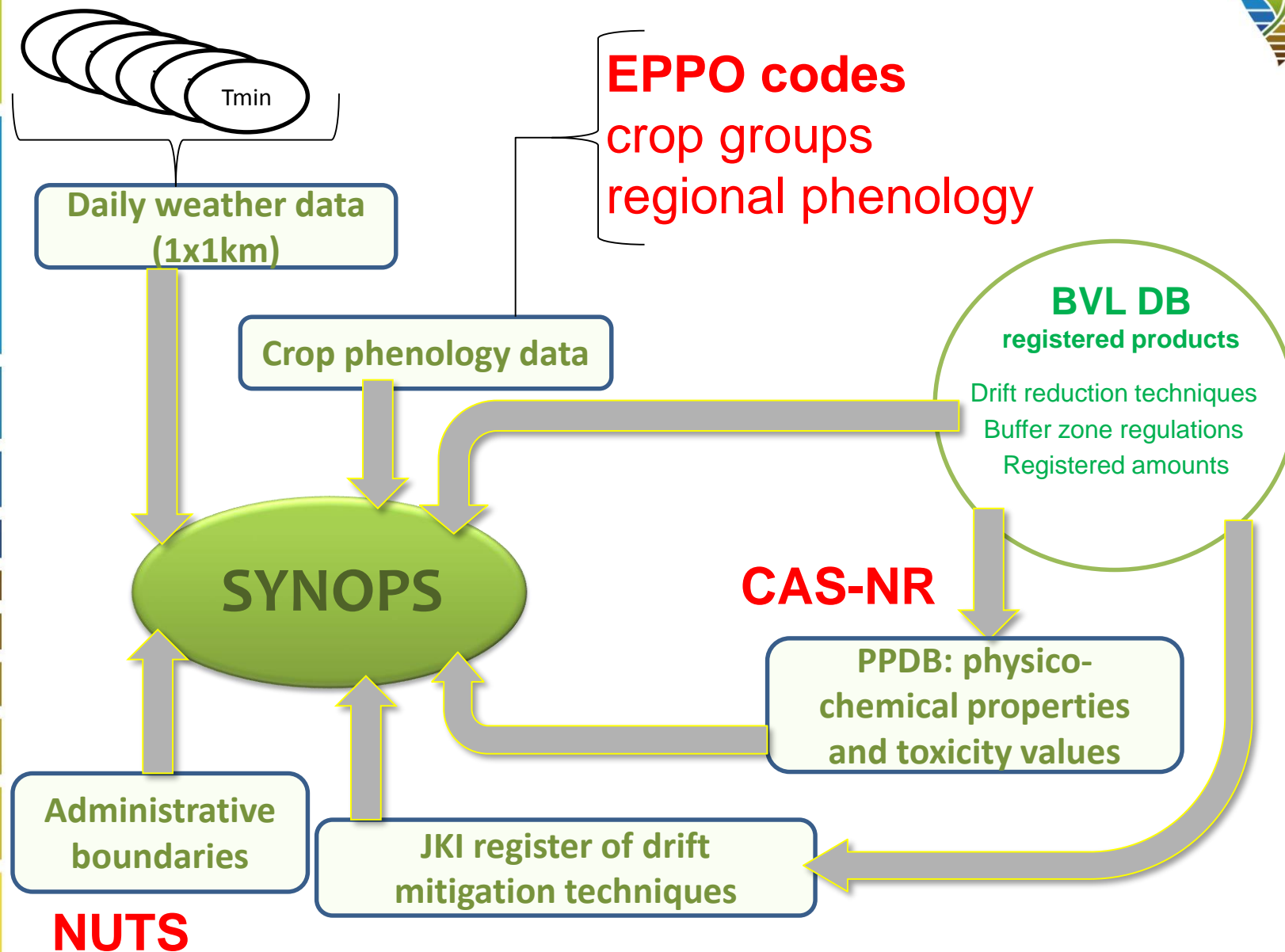


ETR: Surface water ETR: Aquatic organisms DWQS und EQS Max. concentrations [µg OR mg/l??]

Active ingredier	Amount of AI	Product	ETR <sub>chronic</sub>	ETR <sub>acute</sub>	
Pymetrozin	750	Plenum 50 ...	0.04661	0.00428	
Dimoxystro...	100	Cantus Gold	0.02465	0.01829	
Prothiocon...	80	Tilmor	0.00451	0.00097	
azadirachti...	1000	azadirachti...	0.03688	0.00372	
lambda-Cy...	82.5	Karate Zeo...	0.30498	1.62592	
Tebuconazol	160	Tilmor	0.01398	0.00283	
Metconazol	22.5	Carax	0.00026	0.00005	
Picloram	23.45	EFFIGO	0.00077	0.00017	
rape oil	1000	rape oil	0.00885	0.00042	
bacillus thu...	10000	bacillus thu...	0	0	
Bifenox	28800	Fox	0.00001	0.00001	
Etofenprox	575	Trebon 30 EC	0.00001	0.00001	
Mepiquat	120.149994	Carax	0.00001	0.00001	
Propyzamid	7500	Kerb FLO	0.00001	0.00001	
Clopyralid	93.45	EFFIGO	0.00001	0.00001	
Boscalid	100	Cantus Gold	0.00001	0.00001	
all	50407.05	all PPPs	0.00001	0.00001	

Active ingredier	Amount of AI	Product	EQS	EQS exceeden	DWQS	DWQS exceeden
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	0.00001	+++	0.00001	+++

# How **SYNOPS** can benefit from LOD...



# SYNOPS-WEB – outputs as LOD?

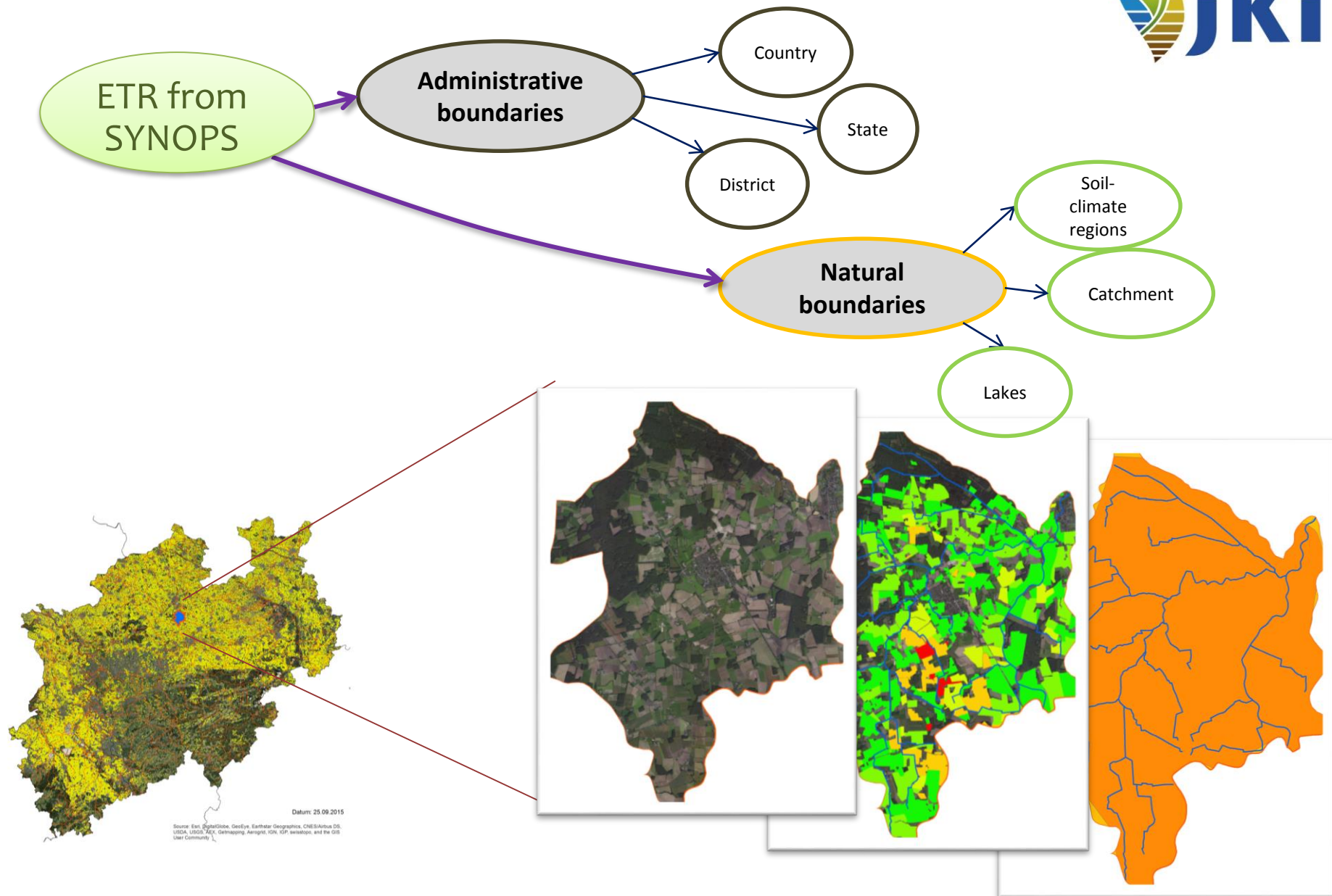


- Too field/farmer specific, the farmer would not want to make it open
- Many fictional simulations are possible and hence not reliable or useful for further analysis
- Not much potential for providing it as open data

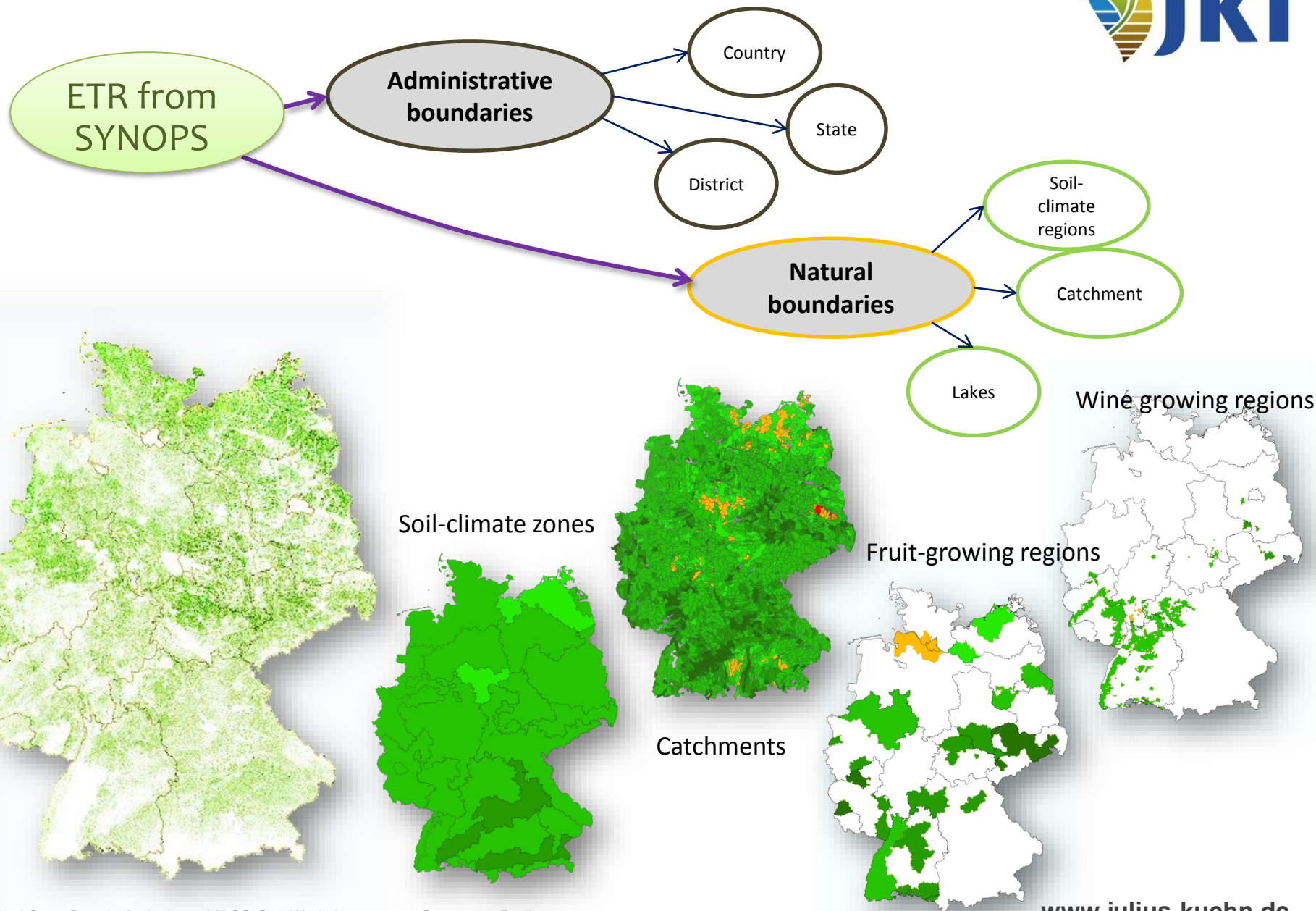
- aimed at non-expert user
- calculations at field-level, results aggregated at various spatial scales
- spatial scales – **catchment, growing regions, district, federal states, national(?)**
- 1.5 million fields for Germany
  - Different possible crop combinations – exact crop location is not known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



# SYNOPS-GIS - outputs

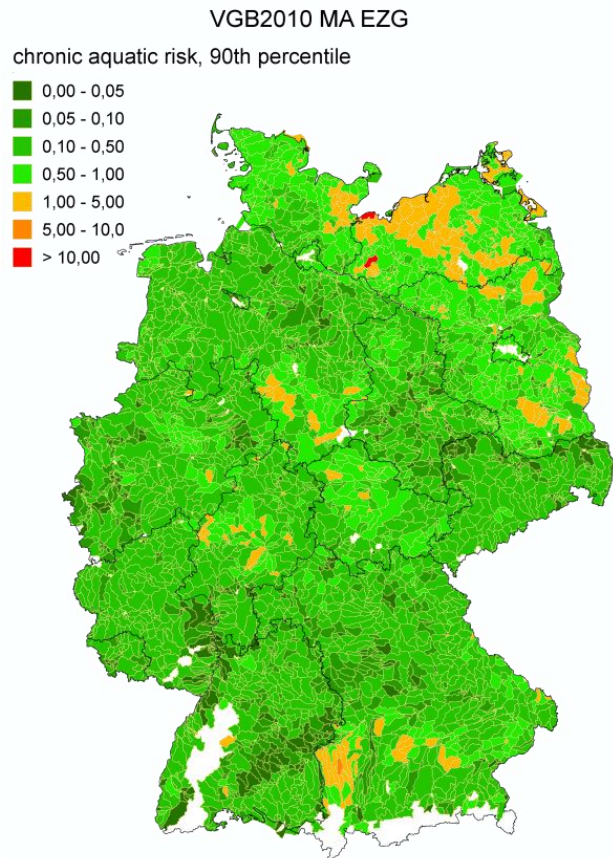
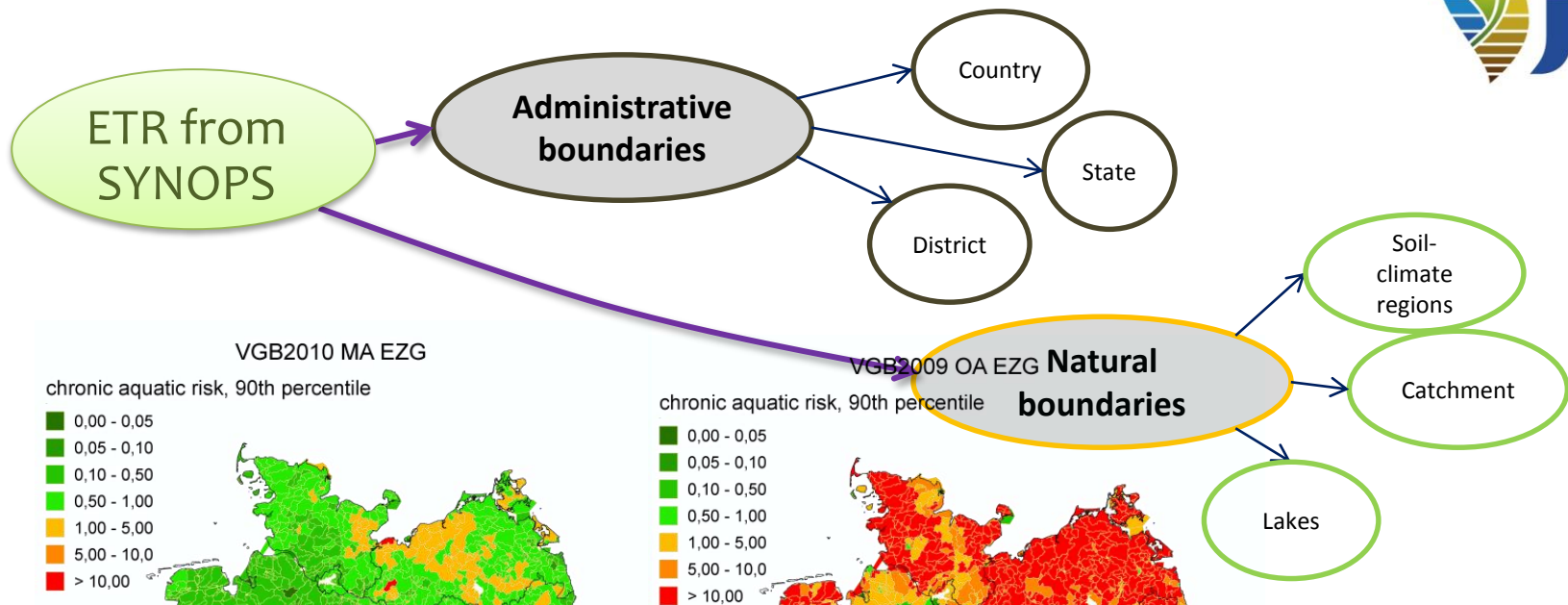


# SYNOPS-GIS - outputs

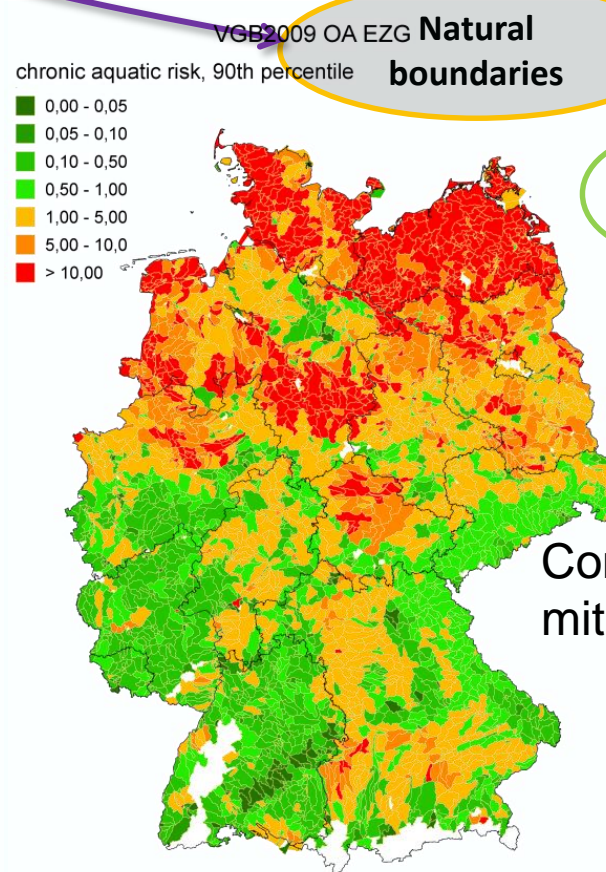




# SYNOPS-GIS - outputs



Datum: 09.09.2011



Datum: 09.09.2011

Comparative analysis of mitigation measures

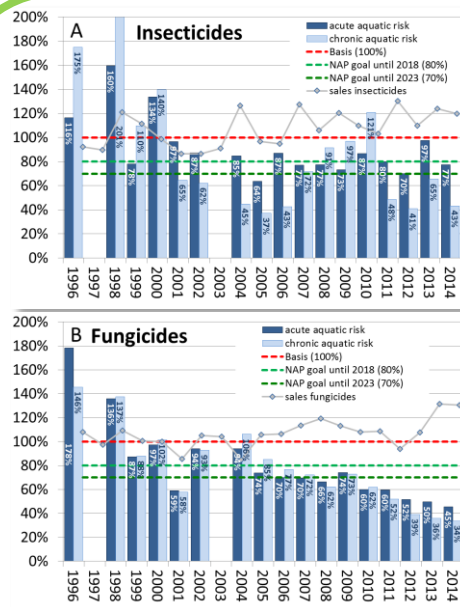
# SYNOPS-TREND



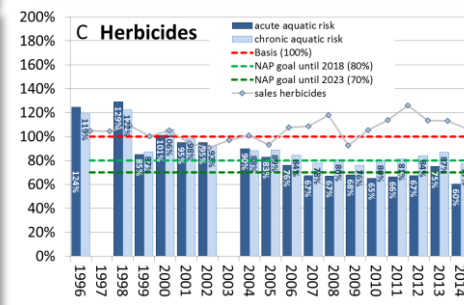
reference period

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

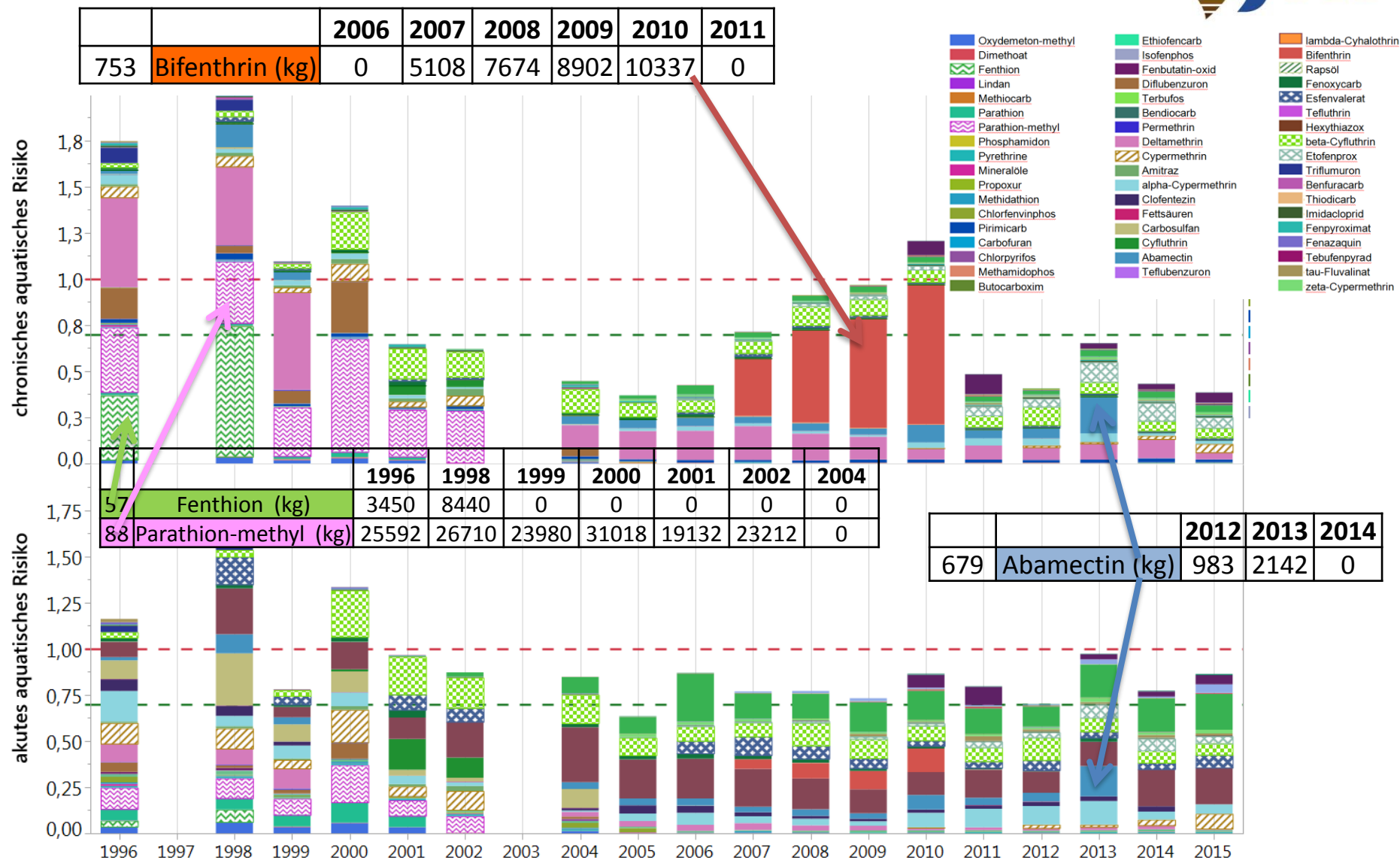


- 2018 , 20 % risk reduction for all three a.i. groups (exception: acute risk of insecticides 14%)

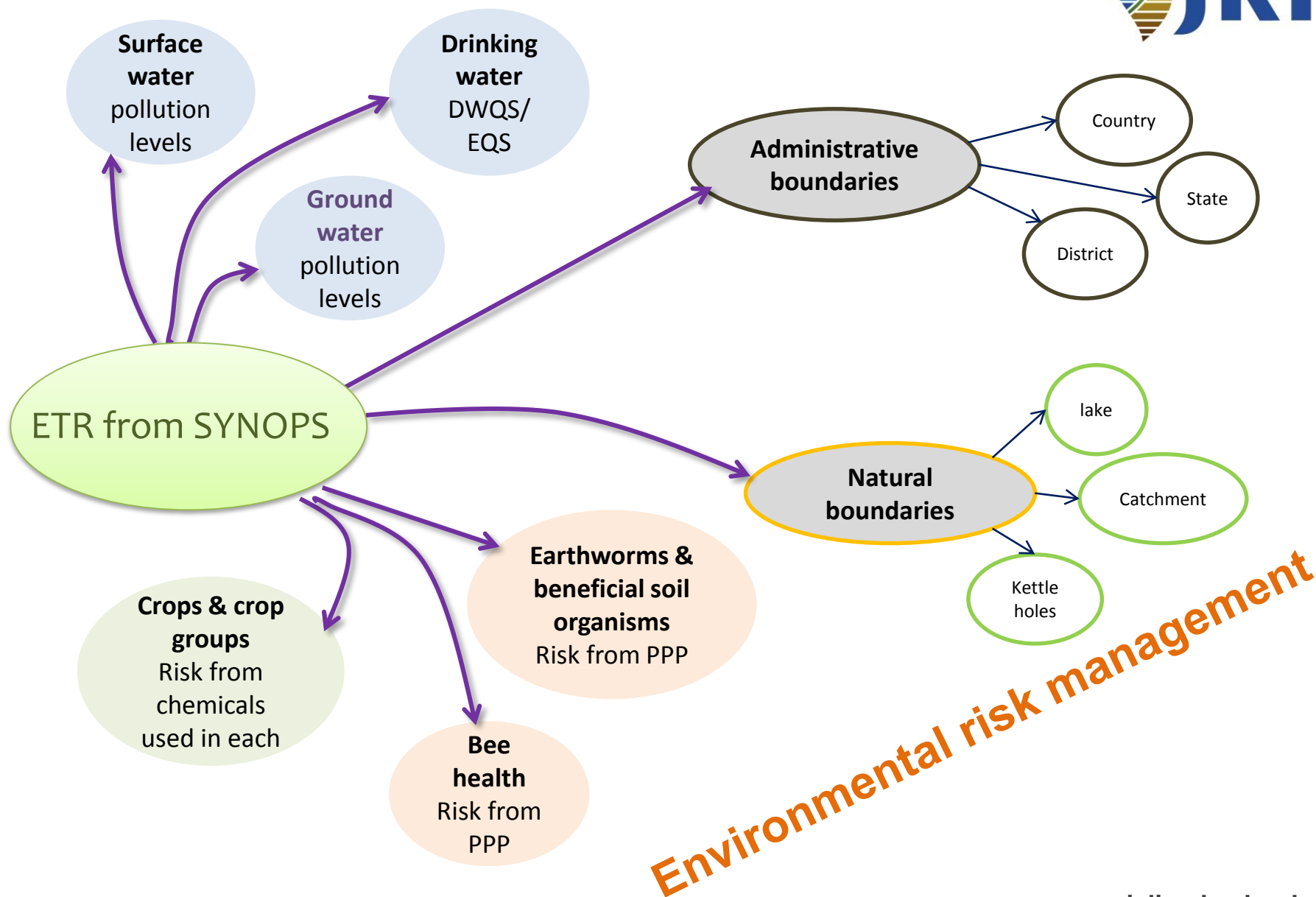




# SYNOPS-TREND



# How SYNOPS can contribute to LOD...



Thank you for your attention!