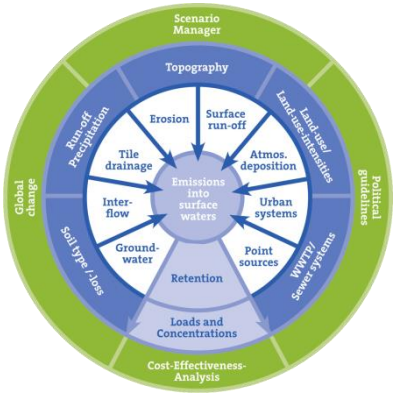
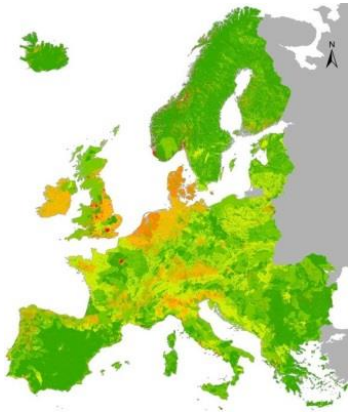
Modelling of nutrient fluxes in the Hampshire Avon catchment with MONERIS





Elena Wenz

Student Research Colloquium, Eberswalde, 23.04.2015

Research for the future of our freshwaters

Context

Joint research project between IGB Berlin and BGS (England):

- Leibniz Institute for Freshwater Ecology & Inland Fisheries (www.igb-berlin.de)
- British Geological Survey (http://www.bgs.ac.uk/)

Purpose:

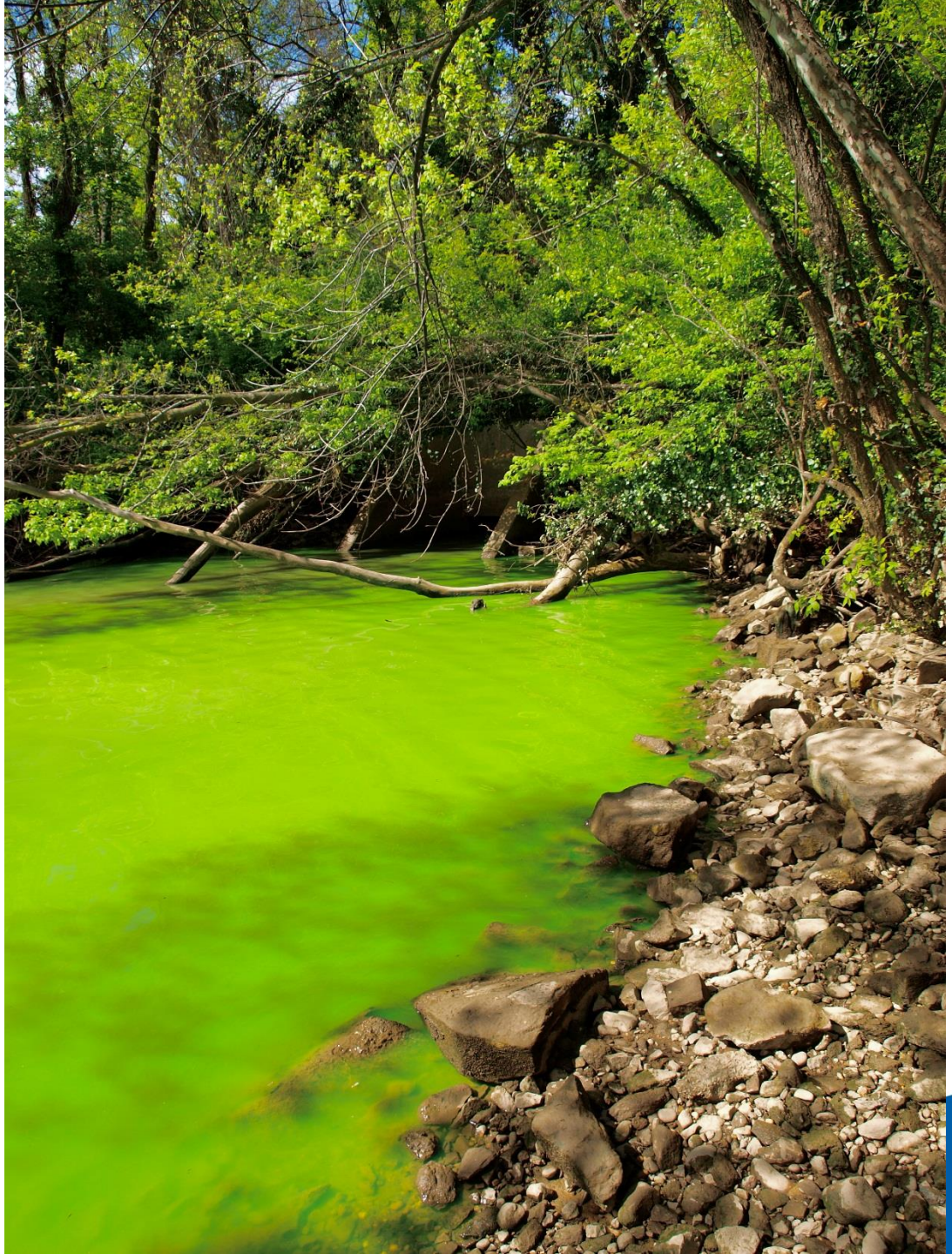
- **Modelling of nitrogen and phosphorus fluxes in the Hampshire Avon catchment using MONERIS**

- (Model comparison of three different models (MONERIS, INCA, Feflow))

Short Introduction

Why model nitrogen and phosphorus fluxes in rivers?

- Eutrophication = harmful effects on river ecosystems
- Europe: about 56% of rivers in moderate / poor conditions
- Research needed to improve management



Source: Wikipedia Commons [1]

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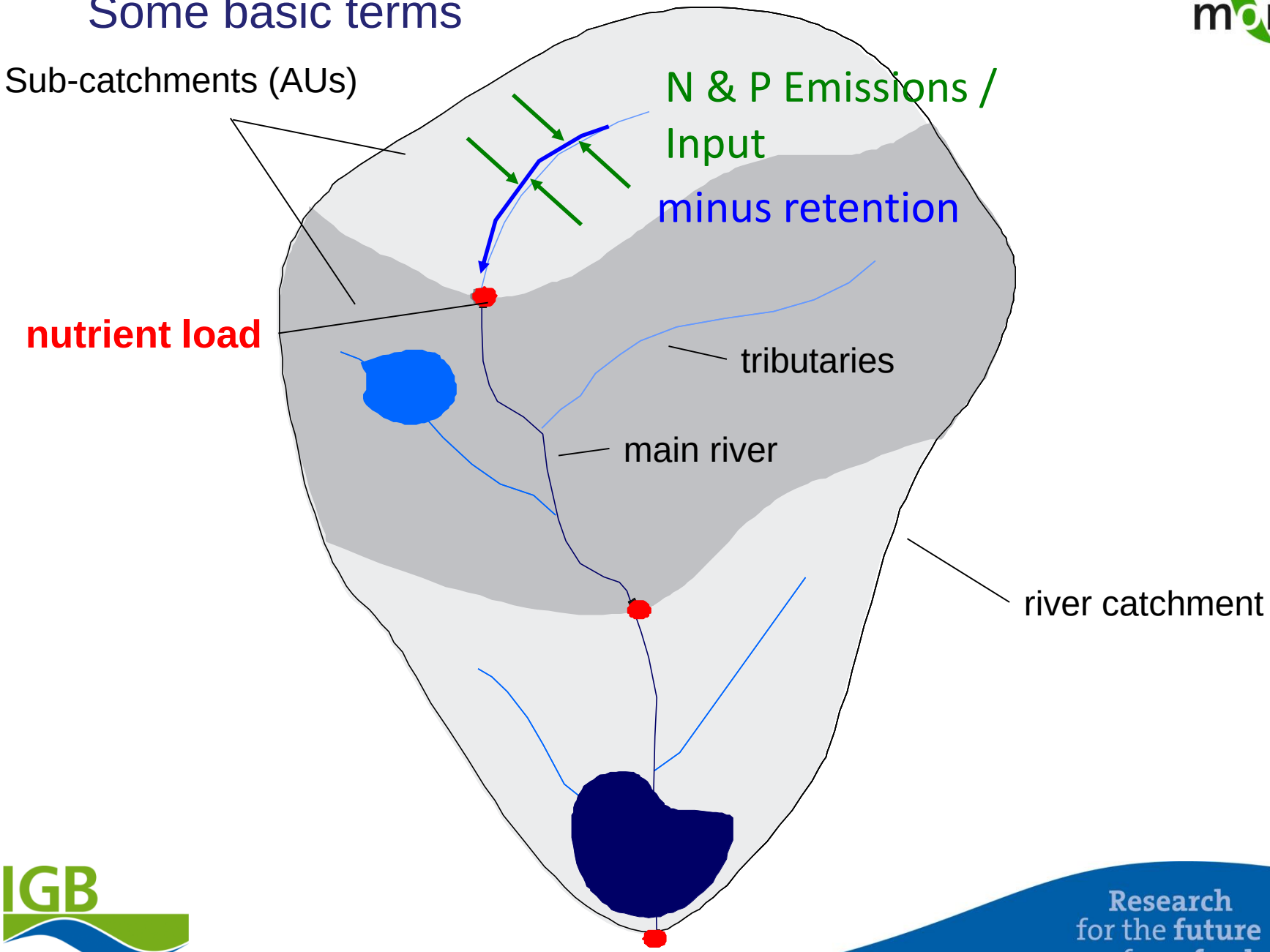
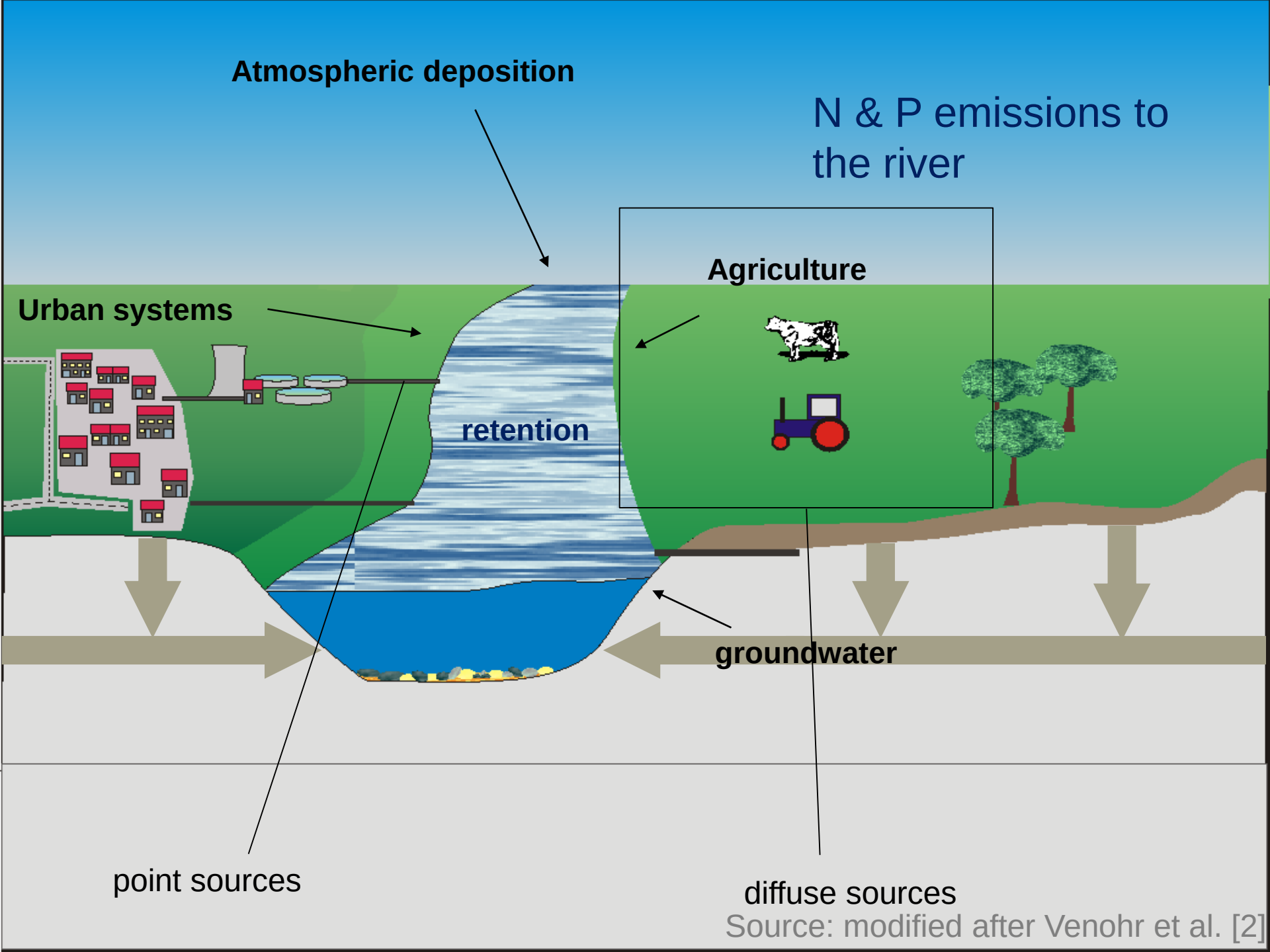
Some basic terms



Source: modified after Venohr et al. [2]



Source: modified after Venohr et al. [2]

MONERIS :

MOdelling Nutrient Emissions in RIver Systems

- Fully documented & published
- open software product

Website: model description, methods, projects
http://www.moneris.igb-berlin.de

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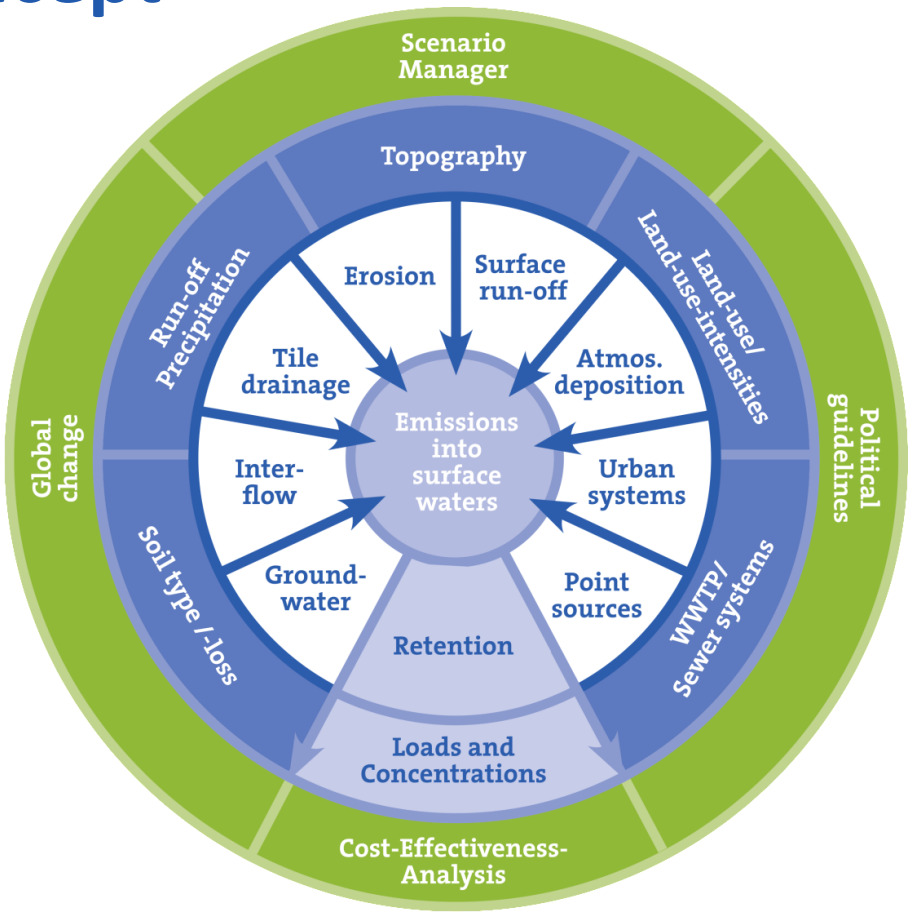
Model Concept



External framework

Catchment characteristics

Pathways

Surface waters

Source: Venohr et al. [4]

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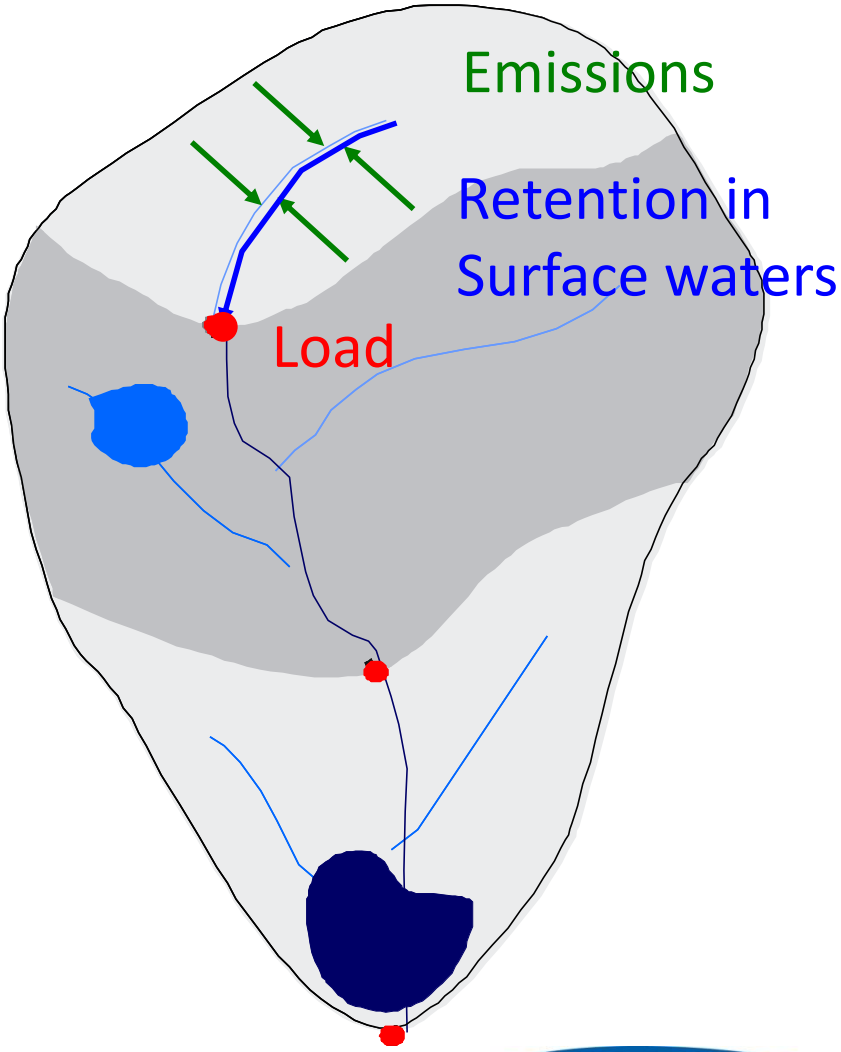
Model concept

Purpose:

Calculate on a monthly & annual basis:

- emissions from different pathways for each analytical unit
- resulting loads in surface waters
- (scenarios, e.g. on effects of climate change and different management options)

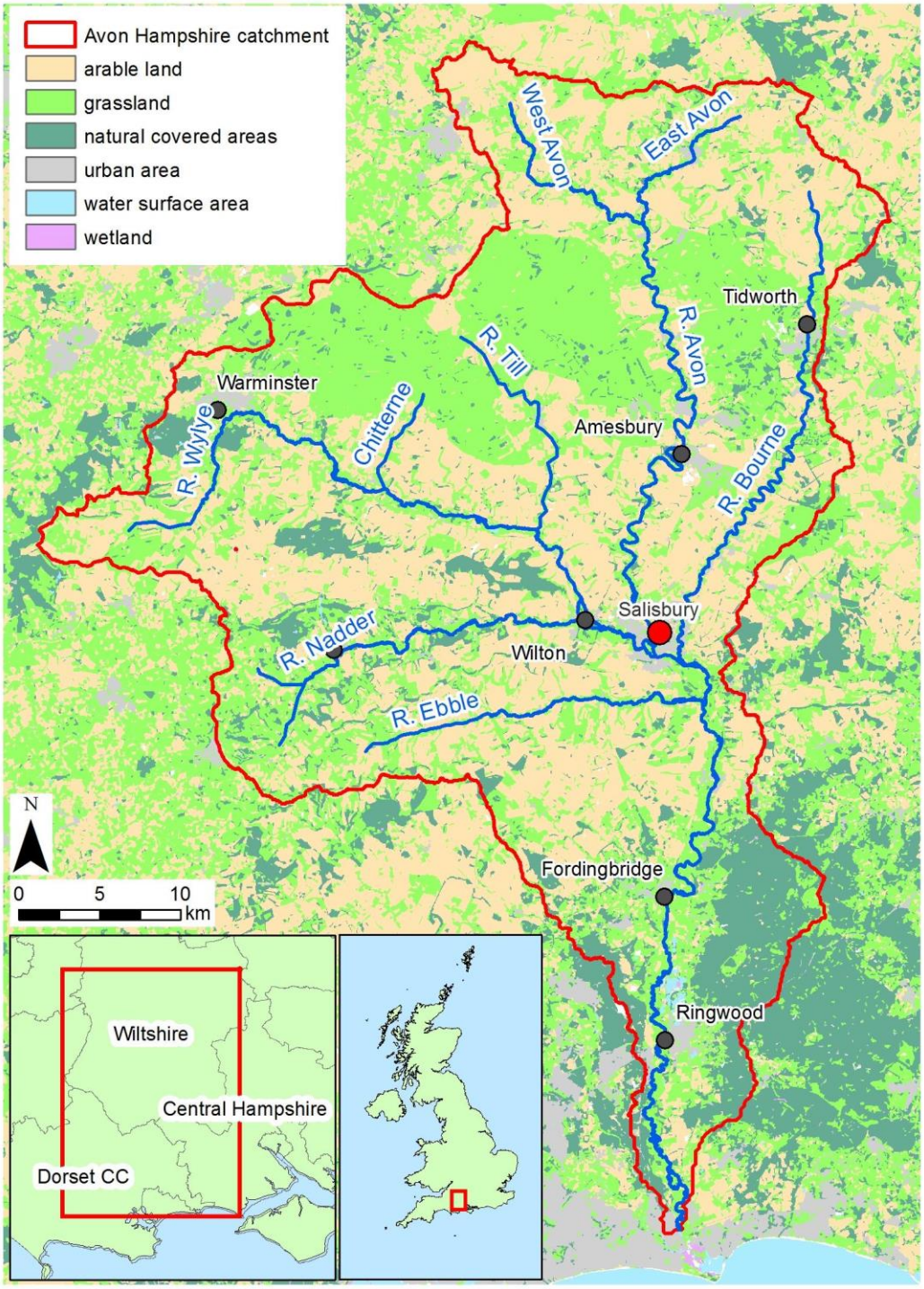


Hampshire Avon Modelling

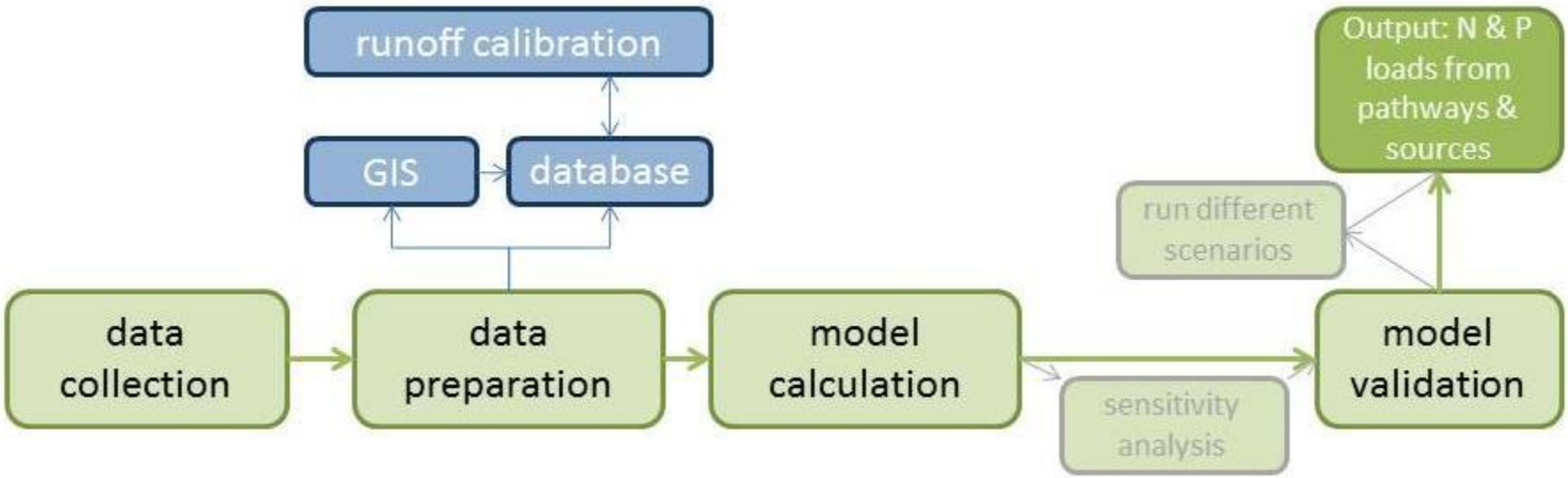
River Avon

Hampshire Avon catchment, South-West England

2000 - 2010



Workflow



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data collection

internet research on available data

literature research

data processing

mails, mails, mails

GIS

assembling the database

Model input data

time series data

river flow

global radiation

population numbers

landcover

Catchment boundaries

Atmospheric N & P deposition

River course

sewage data

soil data

soil erosion

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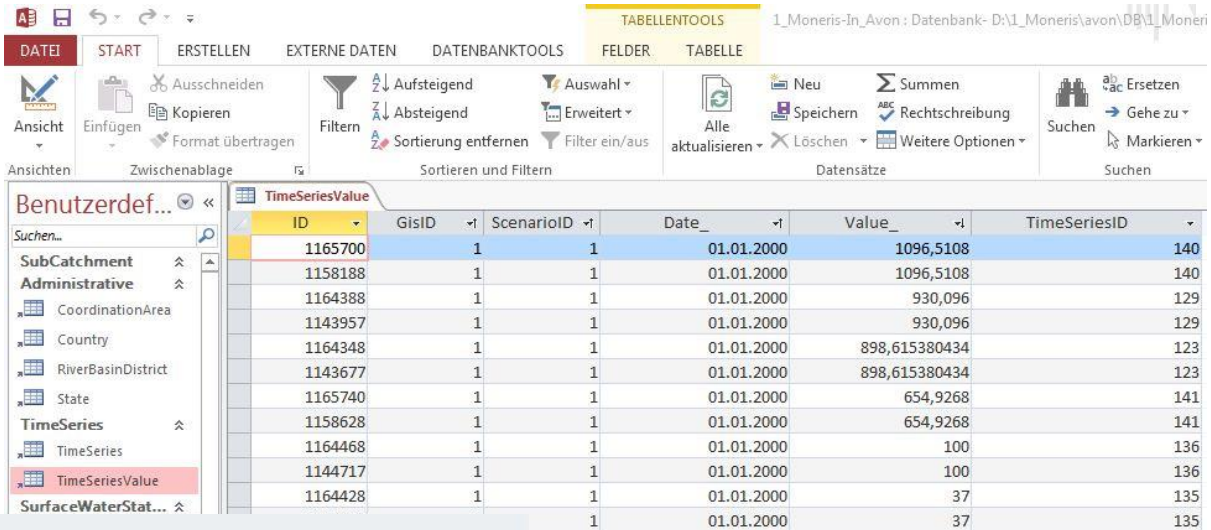
Workflow



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1158188	1	1	01.01.2000	1096,5108	140
1164388	1	1	01.01.2000	930,096	129
1143957	1	1	01.01.2000	930,096	129
1164348	1	1	01.01.2000	898,615380434	123
1143677	1	1	01.01.2000	898,615380434	123
1165740	1	1	01.01.2000	654,9268	141
1158628	1	1	01.01.2000	654,9268	141
1164468	1	1	01.01.2000	100	136
1144717	1	1	01.01.2000	100	136
1164428	1	1	01.01.2000	37	135
		1	01.01.2000	37	135
		1	01.01.2000	30,6813	183
		1	01.01.2000	30,6813	183
		1	01.01.2000	1,95	172
		1	01.01.2000	1,95	172
		1	01.01.2000	1	149
		1	01.01.2000	1	147
		1	01.01.2000	1	147
		1	01.01.2000	1	149
		1	01.01.2000	0,5	189
		1	01.01.2000	0,5	189
		1	01.01.2000	0,2	173
		1	01.01.2000	0,2	173
		1	01.01.2000	0,115	169

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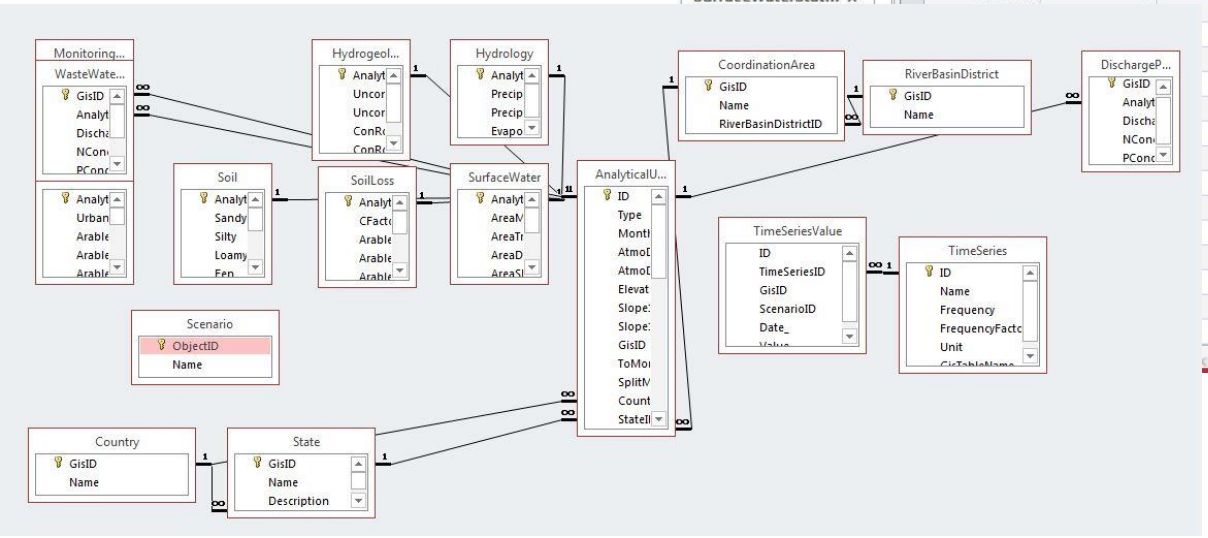

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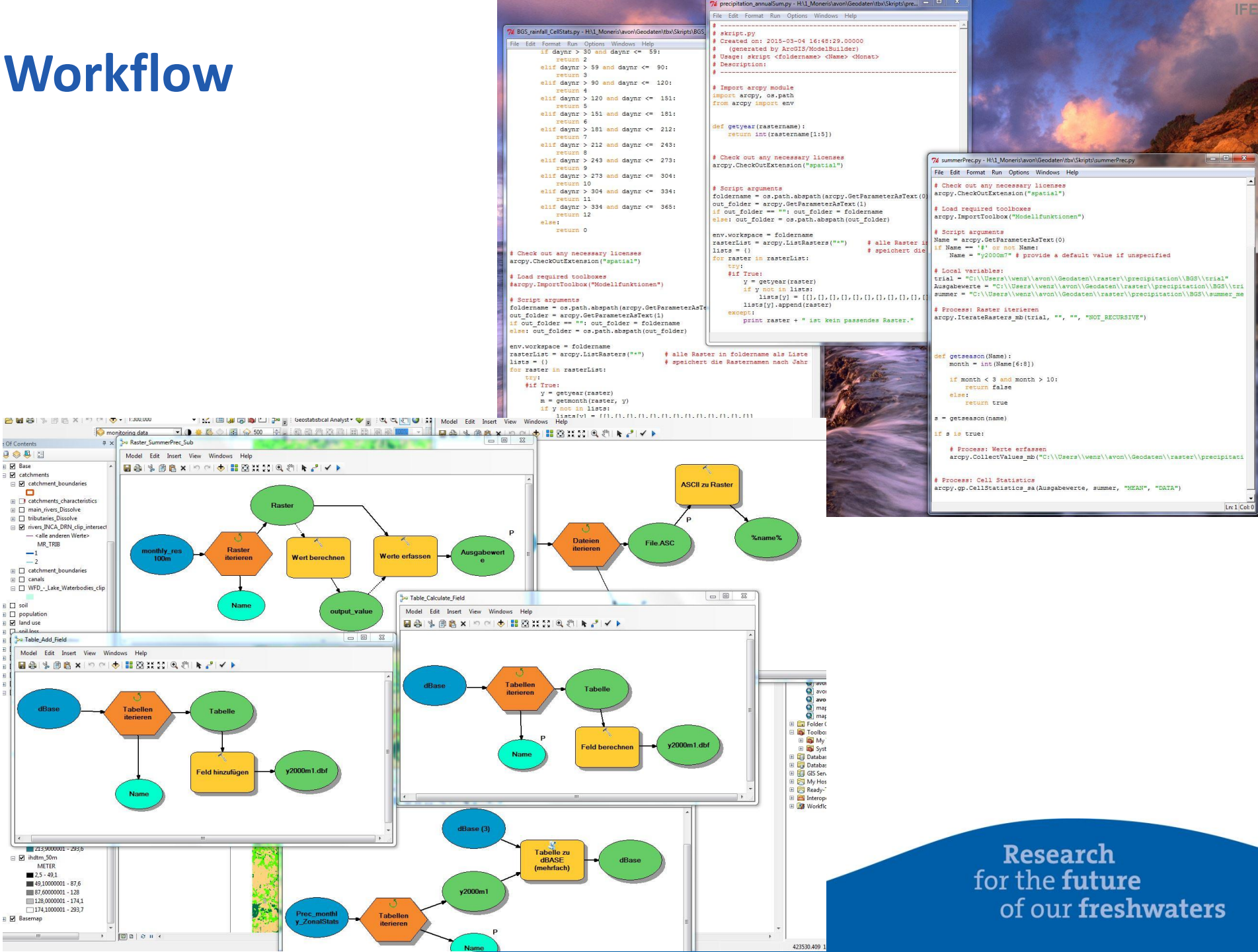
Workflow



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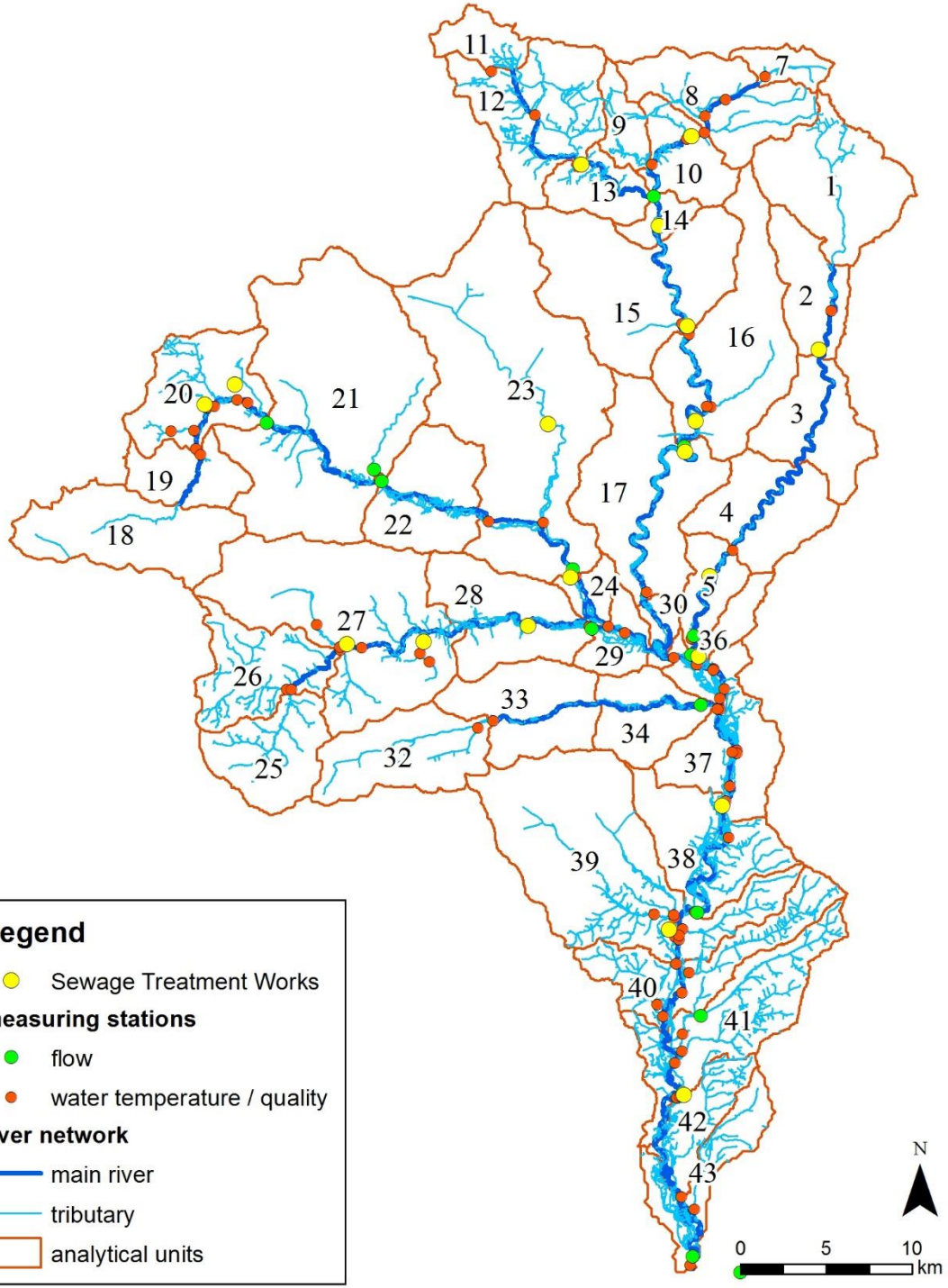
Some Results



Outlook

- Stay in Oxford at the BGS, 05 / 2015
- MONERIS application
- Master Thesis

Sources

Images:

[1] http://upload.wikimedia.org/wikipedia/commons/3/36/Potomac_green_water.JPG, accessed: 04/04/2015

[2] Venohr et al. 2014: Modelling Nutrient Emissions with MONERIS (PP-Presentation at TU Berlin)

Literature:

[3] http://www.moneris.igb-berlin.de

[4] Venohr, M., Hirt, U., Hofmann, J., Opitz, D., Gericke, A., Wetzig, A., Natho, S., Neumann, F., Hürdler, J., Matranga, M., Mahnkopf, J., Gadegast, M., Behrendt, H., 2011: *Modelling of Nutrient Emissions in River Ecosystems – MONERIS – Methods and Background.* Intern. Rev. Hydrobiol. 96, 435 – 483.

Thank you very much for your attention

http://www.moneris.igb-berlin.de/

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… any further questions?