



**WG3**

**Evaluation of Mitigation Options  
to improve water quality**

# *Conceptual framework*

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# Content

- 1. Introduction / Progress**
- 2. Mitigation options / Factsheets**
- 3. Development conceptual framework**
- 4. Conclusions**



# Progress

- 2006** Questionnaire countries about mitigation options (research, implied legislation, new ideas)
- 2007** Overview of P legislation within European Countries (presented in Hamar during WG1 meeting)
- 2007** 1<sup>st</sup> Working Group 3 meeting (Devon)
- Evaluating different types of mitigation options;
  - Suggestion: write factsheets about mitigation options (summaries);
  - Suggestion: built a framework to fit in different mitigation options
- 2008** One day small meeting Amsterdam prep. setting up factsheets
- Categories to structure the list of mitigation options
  - Headings and structure for setting up factsheets
- 2008** 2<sup>nd</sup> Working Group 3 meeting (Rome + session WG4 meeting)
- Evaluating draft factsheets that had been written
  - First draft conceptual framework
- 2009** 3<sup>rd</sup> Working Group 3 meeting (Wageningen)
- Evaluating implementation Mitigation options in RBMP (WFD)
  - Information on the effectiveness of specific types of mitigation options
  - Second draft conceptual framework



## Factsheets (n=60)

Category	Number of factsheets (cluster of measures)
Nutrient management	18
Crop management	1
Livestock management	3
Soil management	18
Water management	10
Land use	0
Land infrastructure	7
Measures in surface water	3



# Factsheets headings

## First drafts of factsheets:

- Description, incl. if effect is aimed at N / P / .. emission
- Rationale, mechanism of action
- Applicability
- Effectiveness, including (un)certainty
- Time frame
- Environmental side-effects / pollution swapping, e.g.
- Relevance, potential for targeting, administrative handling, control
- Costs
- References



# Factsheets

## Examples:

1. Mining

2. Hedgerows

3. Constructed wetlands



## Measures $\leftrightarrow$ Categories $\leftrightarrow$ FS

**Categories were defined in order to cluster more than 100 measures**

Nutrient management

Crop management

Livestock management

Soil management

Water management

Land use

Land infrastructure

Measures in surface water

**Devon: Important aspects in relation to setting up and filling in the conceptual frame work**

- Processes
- Source, soluble, detachment, transport/pathways, connectivity, impact
- Scale: Field, farm, catchment, river basin, national
- Land use / Dairy, arable, etc
- Time scale
- Short term vs long term effectiveness
- Site effects / swapping
- Costs (country dependent)

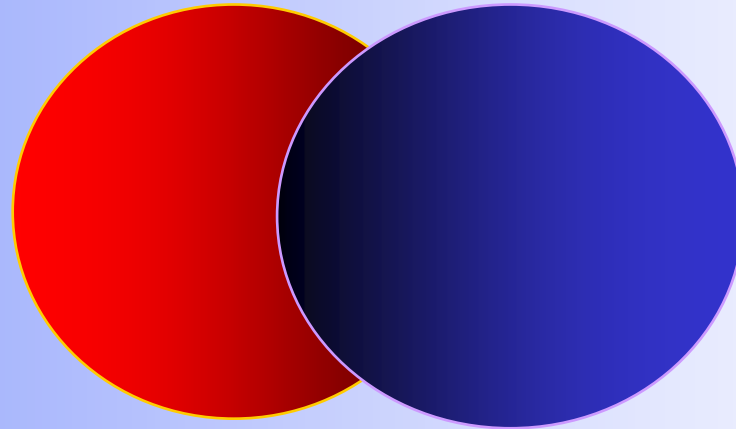
**Information is available in the FS**

**Conceptual framework ???**



# Concepts

Sources



Transport

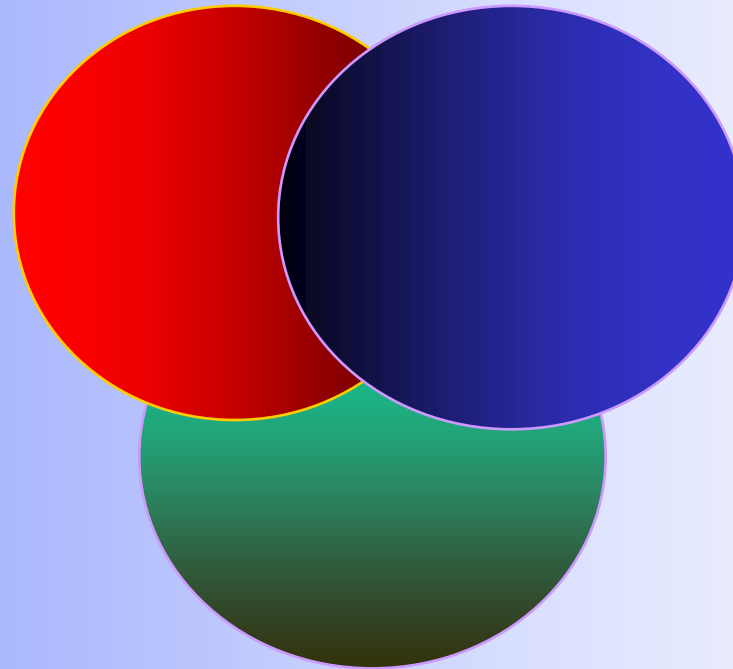
*(Heathwaite, 2004)*





# Concepts

Sources

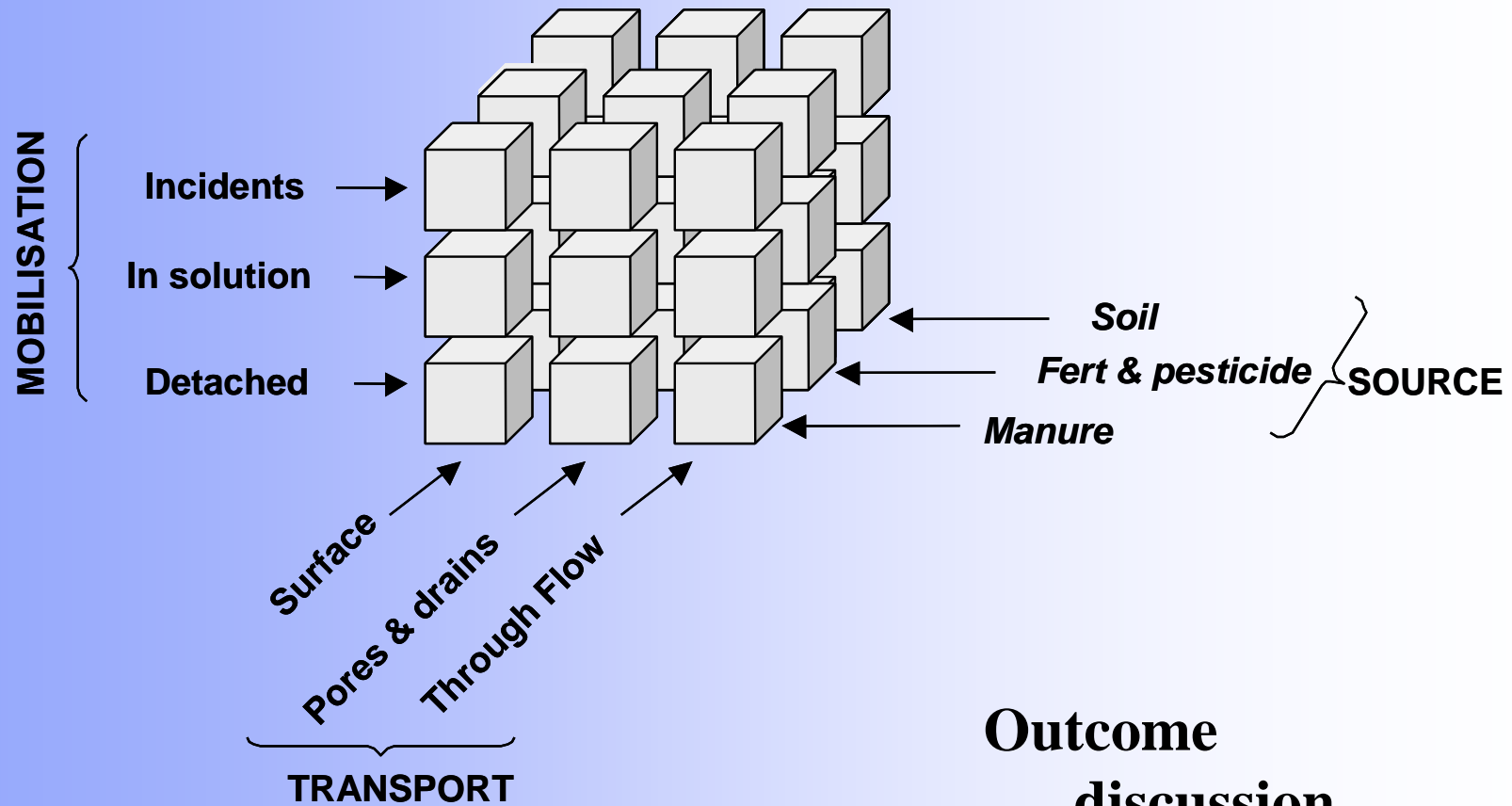


Transport

Connectivity



# Concepts

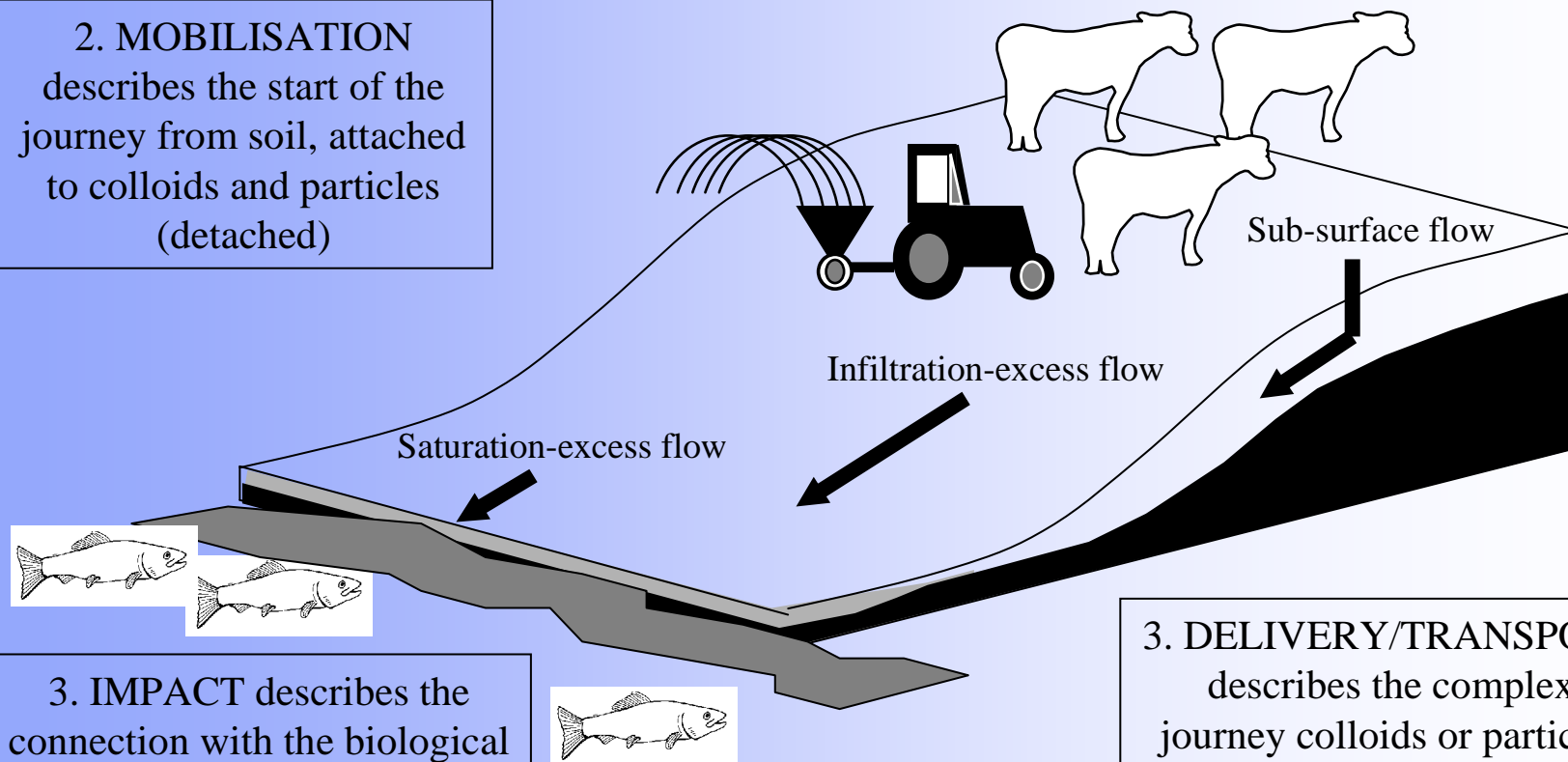


**Outcome  
discussion  
Devon**

## Conceptualisation of the diffuse pollution 'transfer continuum' for sediment

1. SOURCES include fertilizer applications, defecation from grazing animals, spreading of manure on soils

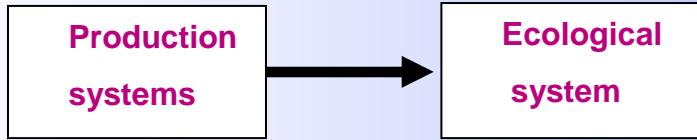
2. MOBILISATION describes the start of the journey from soil, attached to colloids and particles (detached)



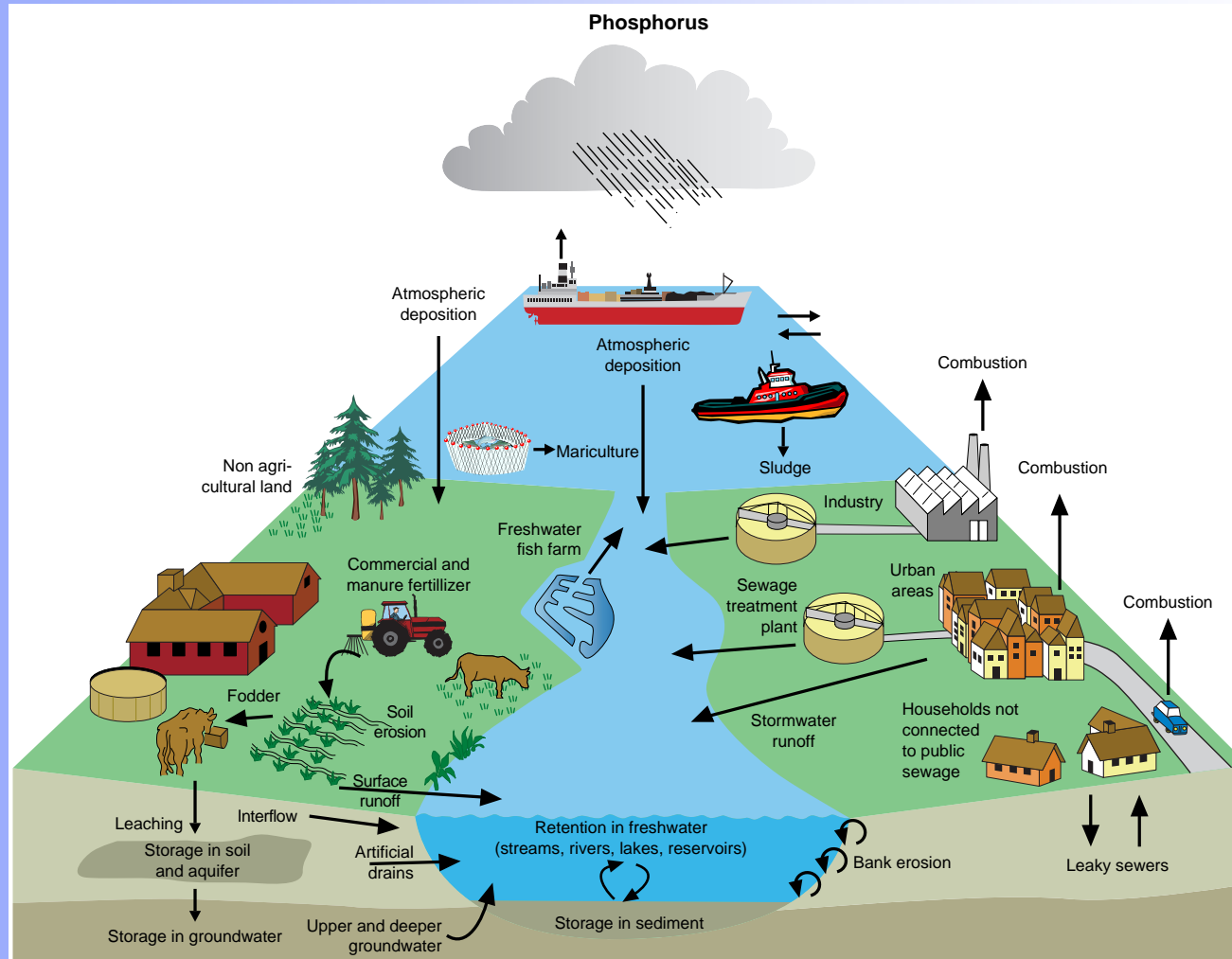
3. DELIVERY/TRANSPORT describes the complex journey colloids or particles take after mobilisation to connect to the stream

3. IMPACT describes the connection with the biological impact of the diffuse substance in the receiving water – the focal point of this project

*(Withers & Haygarth, 2007)*



Steering aspects  
Focus agriculture





# Concepts

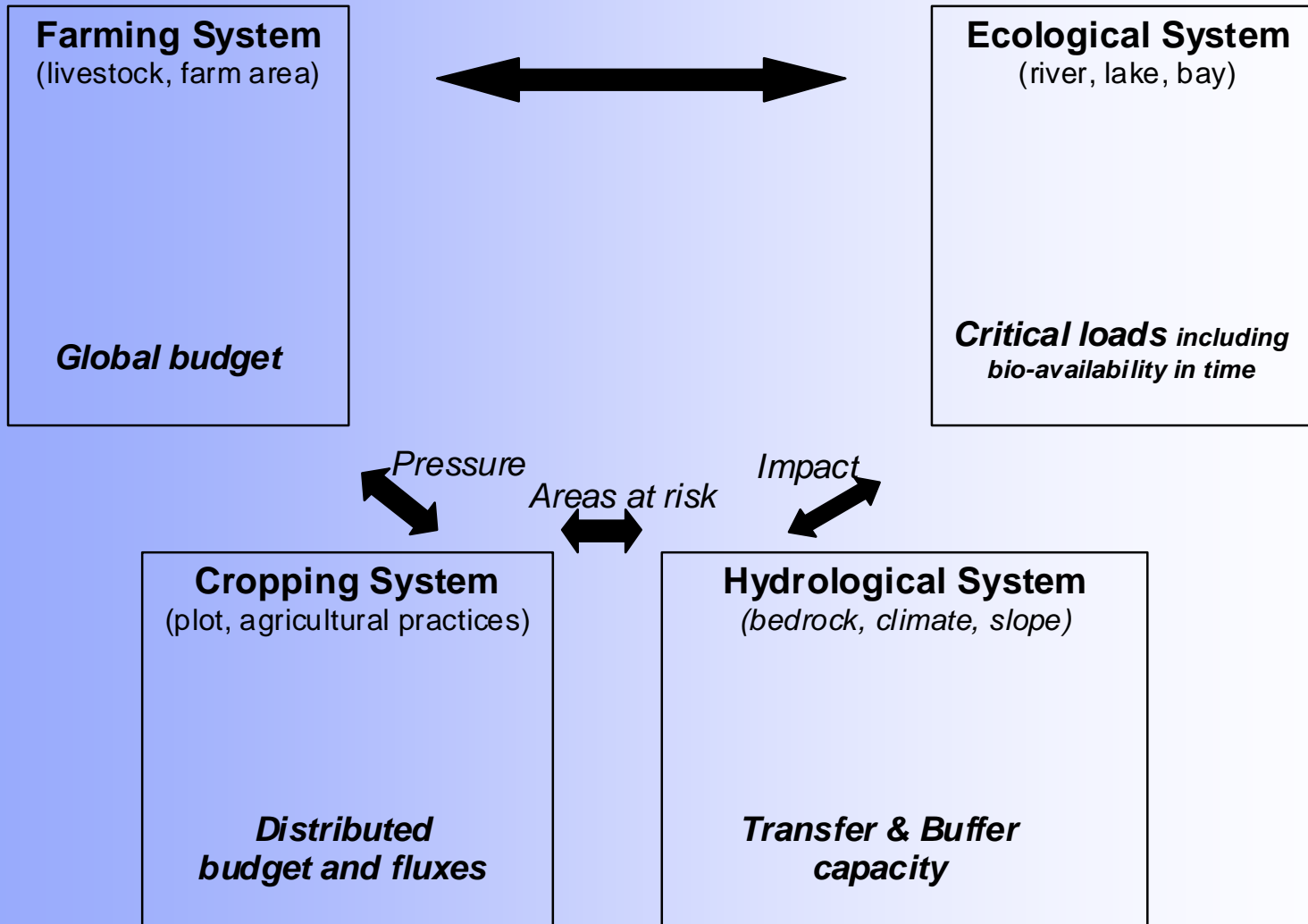
**So far, strongly physical based**

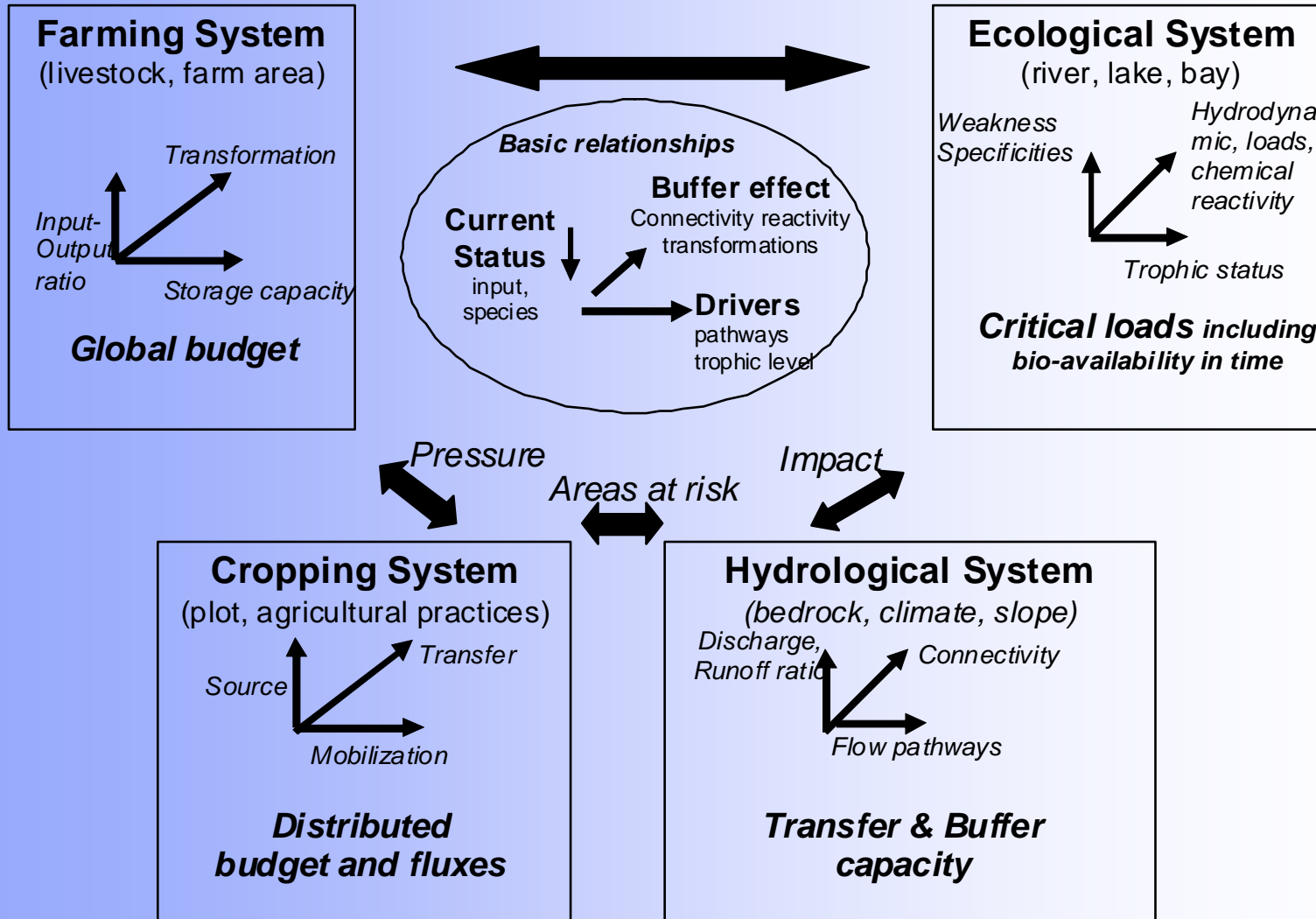


**transport of nutrients  
(overland flow and flow through the soil)**

**Mitigation options: other aspects also relevant e.g.**

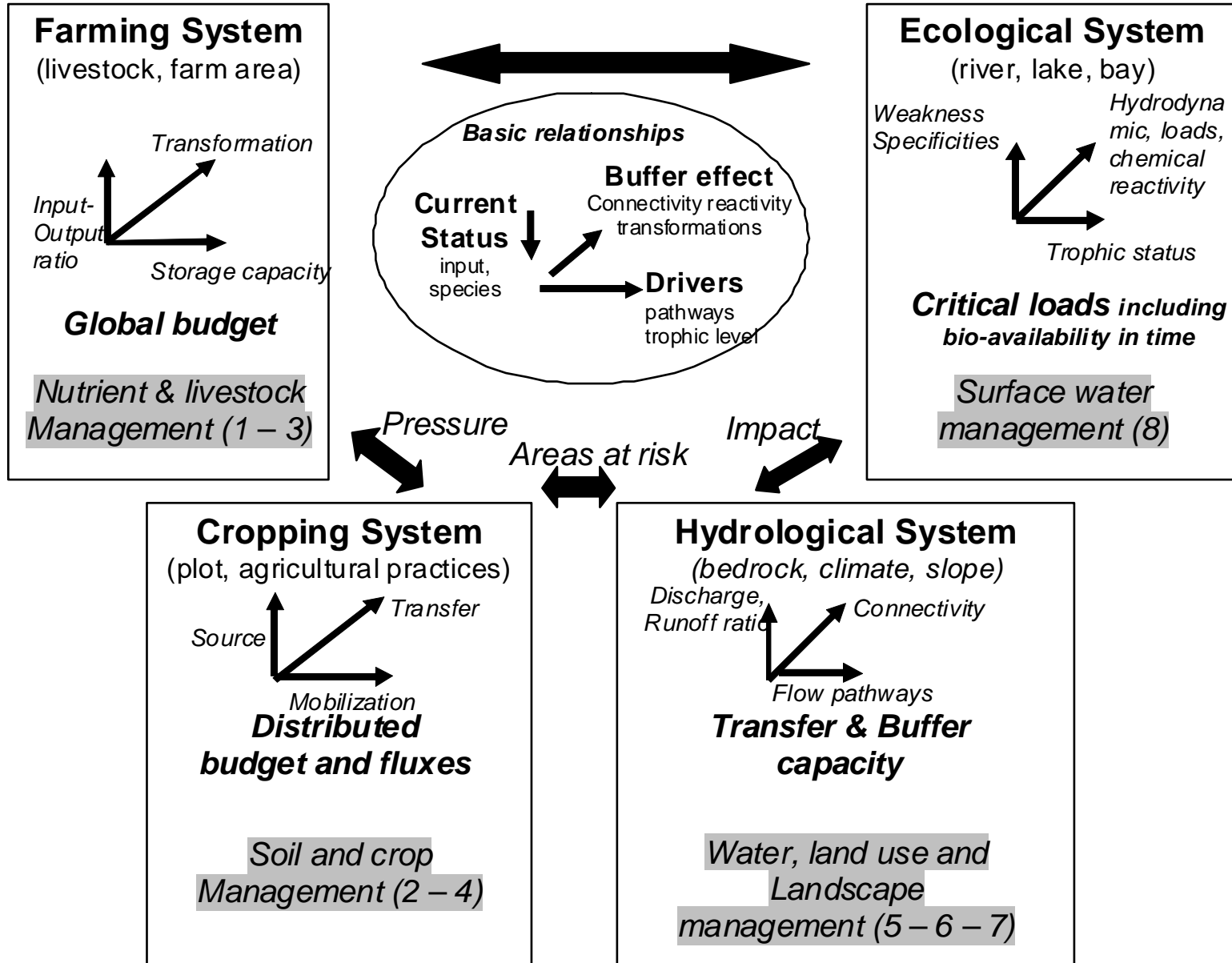
- 1. Sources  $\leftrightarrow$  Farm management & cropping system**
- 2. Receiving waters (lake/farm ditch?)  $\leftrightarrow$  water management**







**Rural development and urbanization** (direct and feedback effect...)







# Conclusions

## Agriculture & nutrient losses:

- **Different concepts have been used → Risk assessment → strongly physical basis**
- **Measures → steering aspects → selection**

### *Management systems*

- **Farm system** → **Nutrient and livestock management**
- **Cropping system** → **Soil and crop management**
- **Hydrological system** → **Landscape / landuse management & water management**
- **Ecological system** → **Water management**



# Questions

- 1) **Does this concept suit you?**
- 2) **Will it help us with respect to selection of measures (from info factsheets)**

**Human system:**

**Political system: legislation and planning (national, basin, county)**

**Management system (farm and other stakeholders)**

**For these two levels:**

- 1) **Evaluation of mitigation options: are they different?**
- 2) **Different approaches for the tool development (dbase/website etc)**
- 3) **Role of modelling**