7th International Science Conference on the Human Dimensions of Global Environmental Change, 26-30 April 2009; Bonn, Germany

Session: Integrative Approaches in Global Change Research - The Experience with Different Integration Methods:

The Integration Characteristic of GLOWA-Elbe

Frank Wechsung, PIK

Characteristic questions[1)]

1. What is the integration aiming to achieve and who is intended to benefit ?
2. What is being integrated ?
3. Who is doing the integration ?
4. How is the integration being undertaken ?
5. What is the context for the integration ?
6. What is the outcome of the integration ?

[1)] Bammer, G. (2006) A systematic approach to integration in research. Integration Insights #1, September. Available at www.anu.edu.au/iisn.

What is the integration aiming to achieve …

General Objective:

Adjustment of water management strategies to global change

Topics:

- Surface water quality
- Surface water quantity

Phases:

1. 2000-2003 Exploration of the basin
2. 2004-2007 Solutions for the basin
3. 2007-2010 Transfer of Tools

Water quantity – adjustig to lower water supply

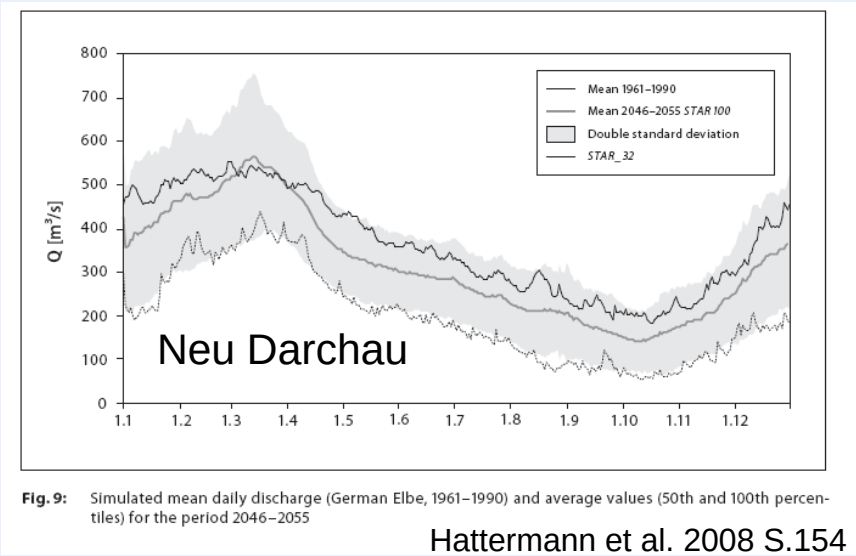


Fig. 9: Simulated mean daily discharge (German Elbe, 1961–1990) and average values (50th and 100th percentiles) for the period 2046–2055

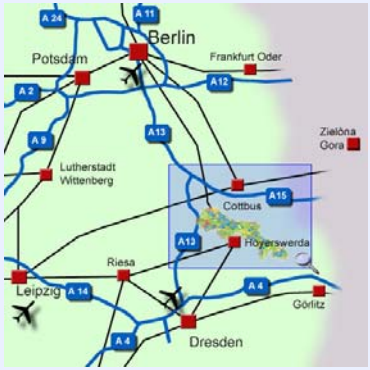
Hattermann et al. 2008 S.154

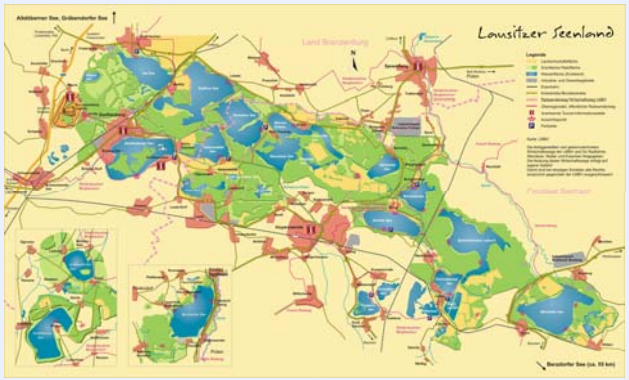
Transportation

Thermal power plants

Wet lands

Water quantity – establishing new water sites

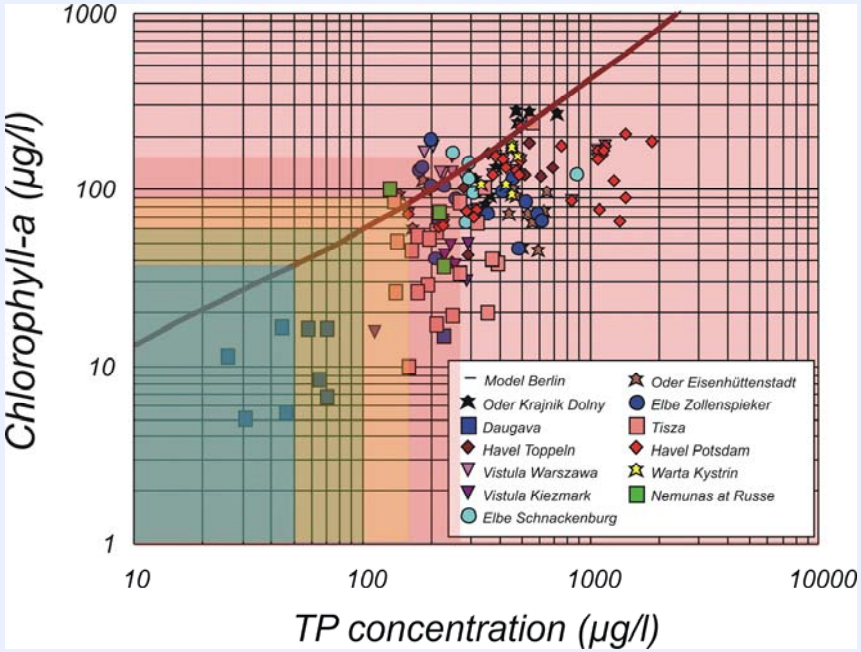




Watering of open pits after suspending coal mining

Quality – achieving the good ecological state

Eutrophication near Werder/Havel 2002



… and
who is intended to benefit ?

- Whole basin water authority (International Commission for the Protection of the Elbe River)
- Joint water authority for the German State (River Basin Community Elbe)
- Sector stakeholder (Energy, Mining, Agriculture, Chemistry, Tourism, Water and water waste plants)
- Local water authorities
- Environmental pressure groups.

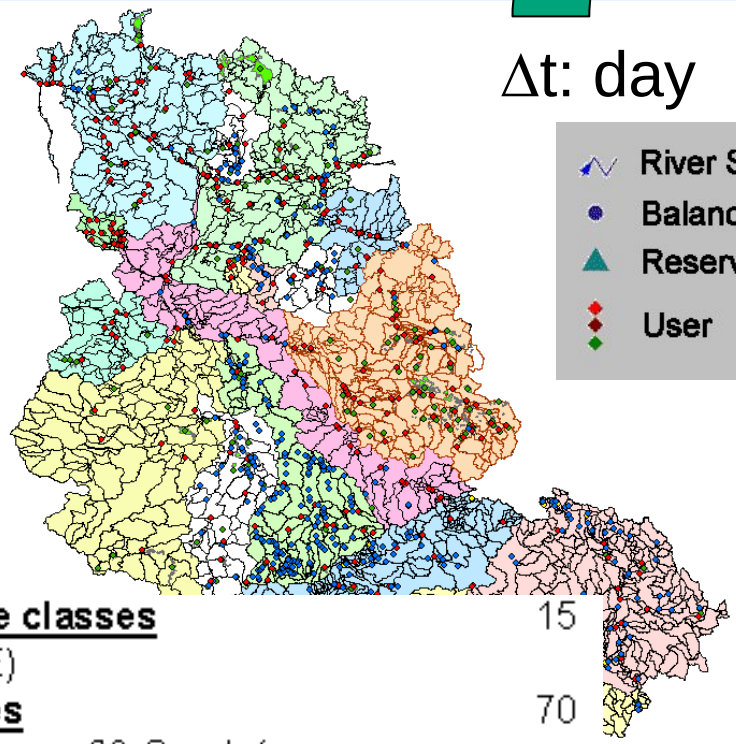
What is being integrated ?

- Components of global change
  (climate change, demographic change, technological change, economic changes)
- Spatial scales of changes
  (global, national, basin, sub-basin, grids, plots)
- Temporal scales of changes
  (pentads, years, month, days)
- Attitudes of the future
  (conservative extrapolation, experimental variation)
- Degrees of uncertainty
- Interests
  (Funding, Publication, Policy advice, Different strategic interests of stakeholders)

Bridging spatial and temporal scale differences: example I

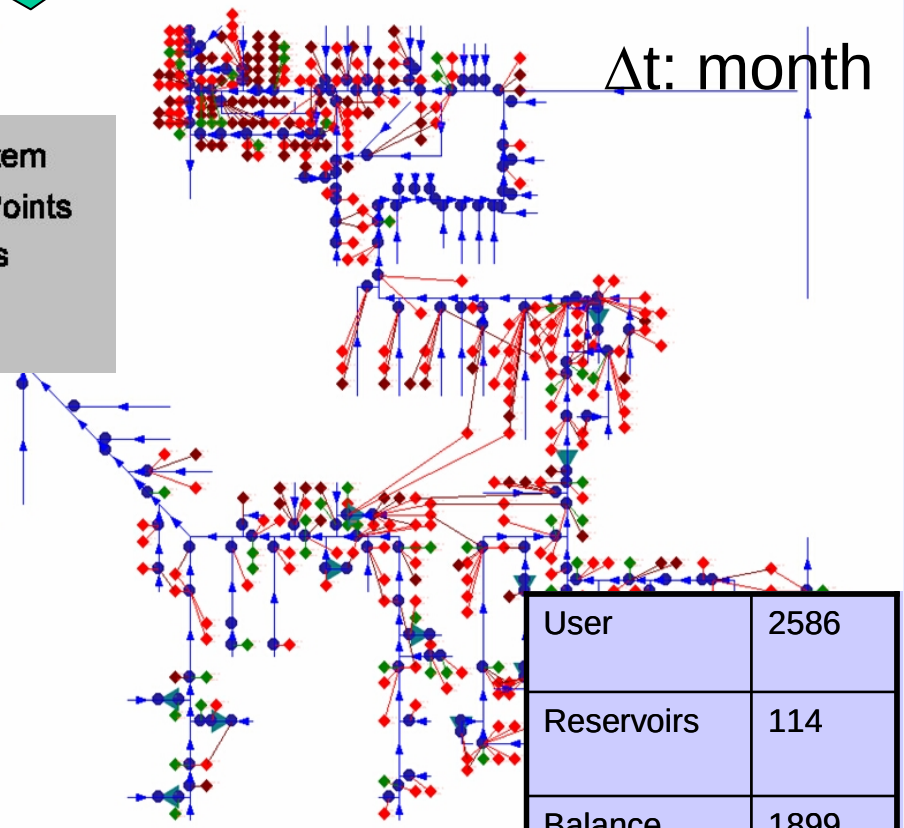
SWIM: water supply

WBalMo: water management



Δt: day

Δt: month



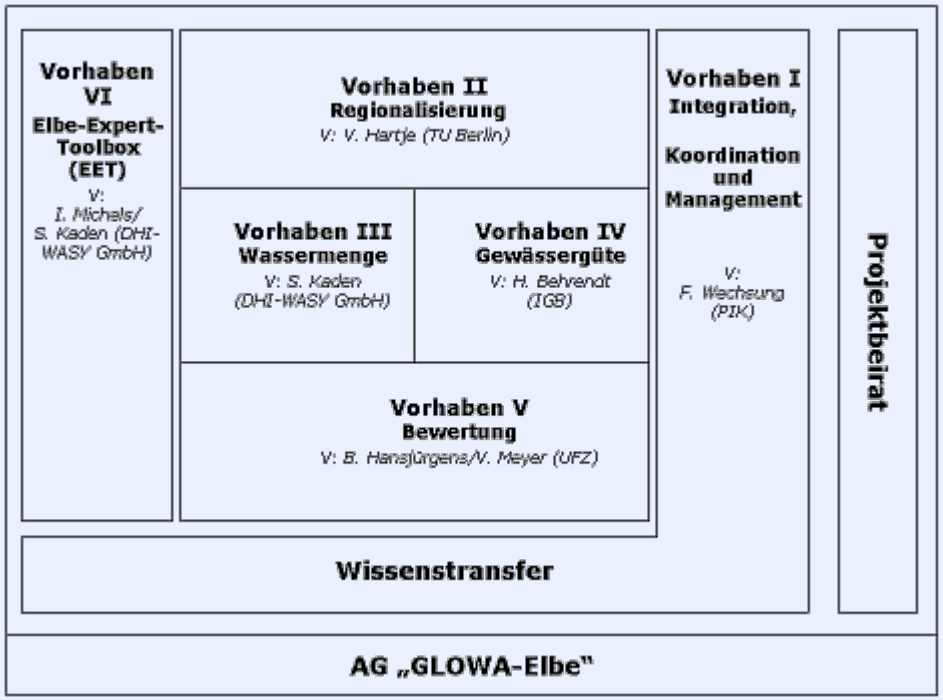
Land use classes (CORINE)	15
Soil types 50 German + 20 Czech (map based on BÜK 1000 and Němeček et al. 2005 homogenized by Conradt and Hesse 2006)	70
Hydrotopes	42708
Subbasins	2255

User	2586
Reservoirs	114
Balance profiles	1899
Subregions	832

(Conradt et al. 2006)

(Kaden et al. 2004)

Who is doing the integration ?



- Projects with clearly assigned responsibilities were defined on the basis of thematic and problem-oriented criteria.
- Highly correlated subtasks and work packages were bundled within projects.

How is the integration being undertaken ?

- ✓ **Dialogue based:**
  initialized by GLOWA-Elbe hypothesis workshops are carried out with stakeholders discussing
  - •the scenarios,
  - •the outcome of scenario studies,
  - •options for adaptation
- ✓ **Model based:**
  GLOWA-Elbe modeling system
- ✓ **Product based:**
  GLOWA-Elbe Toolbox
- ✓ **Vision based:**
  First complete whole basin assessment, European Water Frame Directive
- ✓ **Common metric based:**
  GLOWA-Elbe language calculus

1	Scenario
2	Indicators & criteria
3	Impact
4	Evaluation

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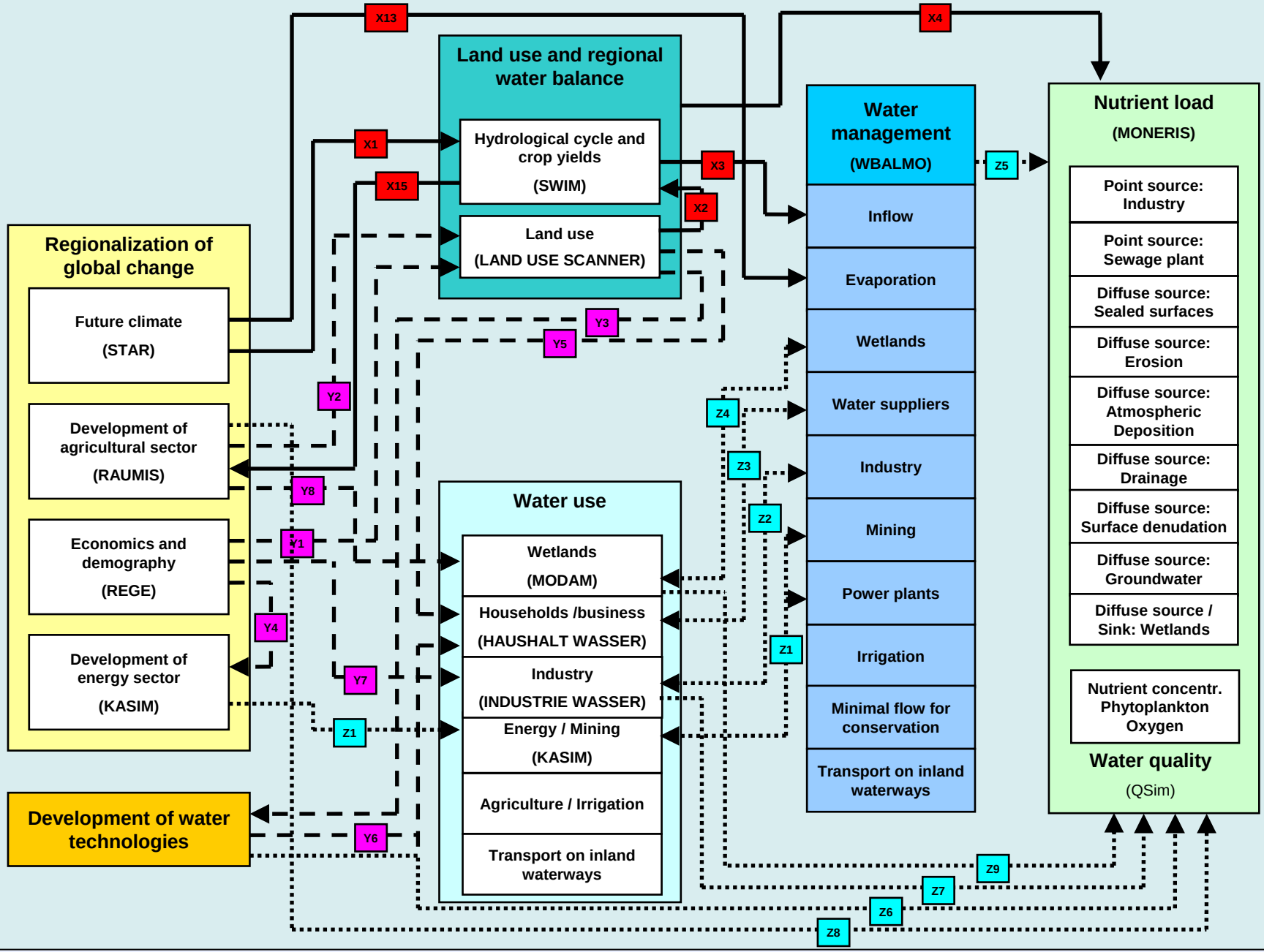
GLOWA-Elbe modeling system



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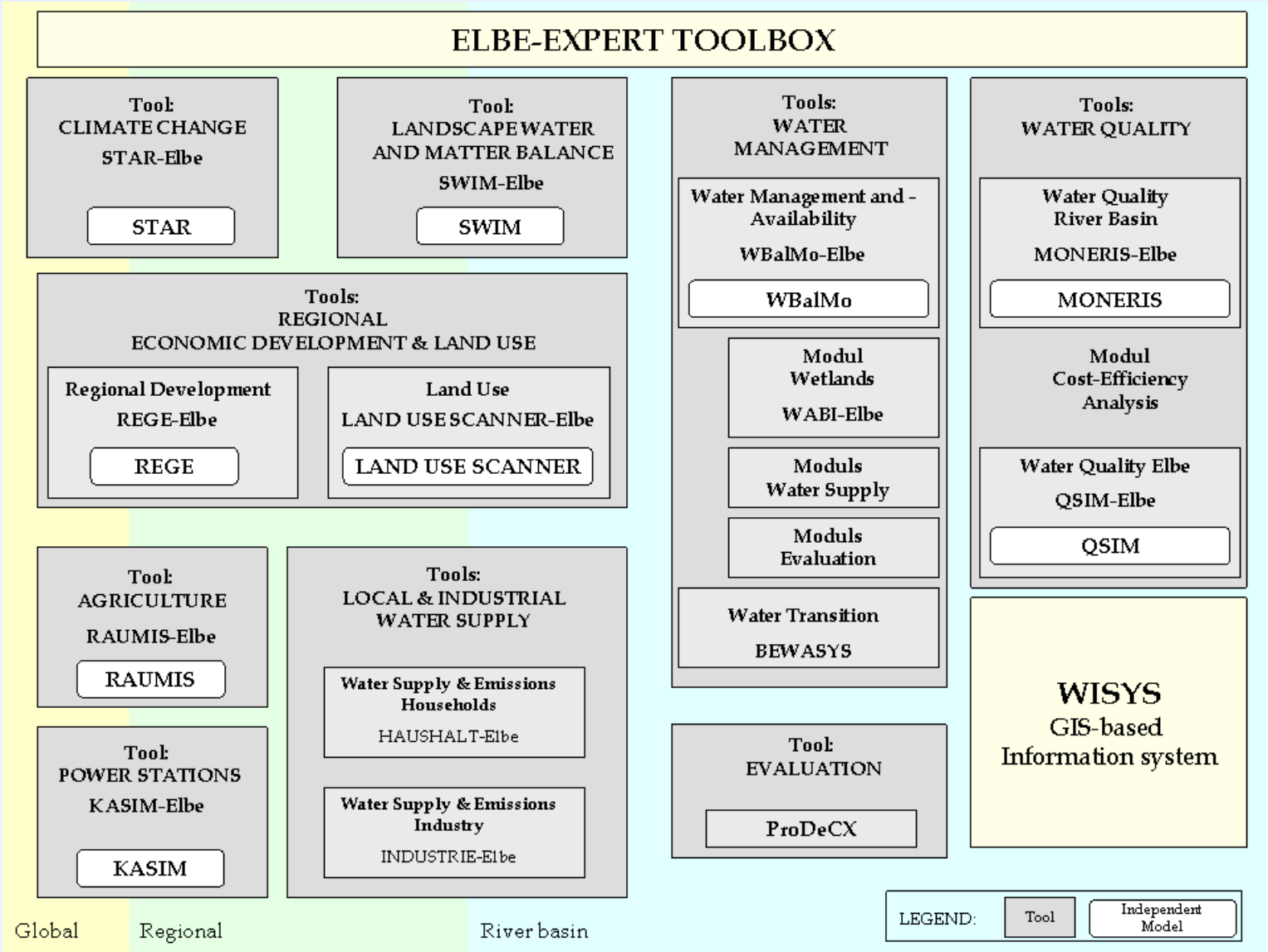
GLOWA-Elbe product



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How is the integration being undertaken ?

Tab. 8: Overview of the main categories of the IMA language calculus and logical conventions

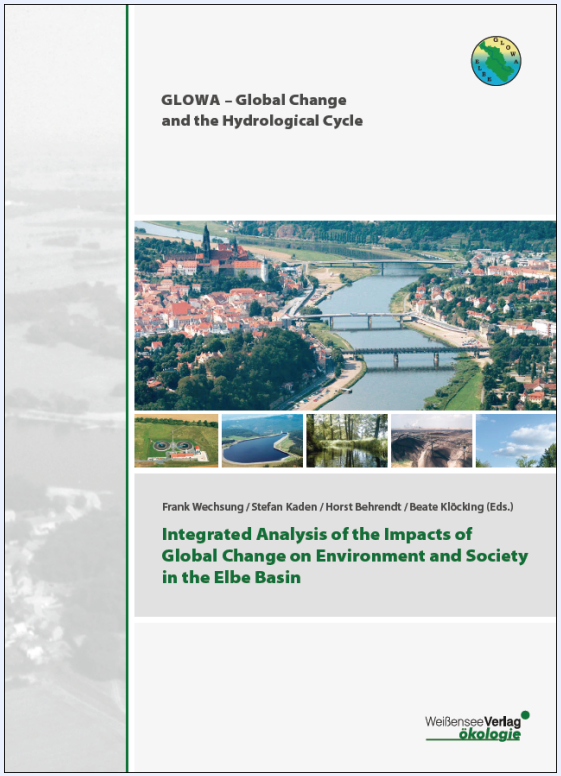
	Abbreviation	Explanation
Categories	MSC	Master scenarios (regional problems, conflicts, topics, task formulation)
	LBD	"Leitbild" or vision of sustainable development
	REG	Regions (geographic objects of research)
	TIV	Time intervals (simulation intervals for scenarios)
	EXO	Exogenous drivers (components of global change, dynamics of driving forces)
	FOD	Frameworks of development, subsets of EXO
	ALT	Management alternatives (management strategies, bundles of options)
	DSC	Development scenarios, combinations of ALT and EXO/FOD
	MFD	Management fields (fields for management activities)
	MOD	Models (methods, instruments)
	IND	Single indicators (variables, state variables)
	AvC	Alternatives vs. criteria
	AvS	Alternatives vs. stakeholder
Logic	$A, A_1, A_2, \ldots$	Single representatives
	$\mathbf{A_1, A_2}$	Amount of representatives
	$\mathbf{A}$	Entirety of representatives
	C (A, B)	C refers to A, B
	U [V, W]	U is composed of V, W

What is the context for integration ?

- General climate change awareness debate
- Water Frame Directive for achieving the ‘good ecological state’ in European rivers until 2009/15/21
- Society debates about
  - use of the Elbe river for transportation and following requests for the water way design (renaturation vs. canalisation and construction of barrages)
  - Land use orientation (forest vs. agriculture, native forest vs. forest plantations, bio energy vs. food)
  - Replacement of thermal power stations based on lignite, gas or biomass

What is the outcome of integration ?

- **GLOWA-Elbe Toolbox**
- **Application cases for a wide spectrum of climate scenarios**
  - *Integrated strategies for a basin wide Management of low water and floods with the following management fields*
    - Reservoir control of the Moldau and Saale dams in the Czech and German upper parts
    - Prioritization system for up- and low stream water requests
    - Water supply for wet lands
    - Monetary incentives and legal requests for controlling water demand
    - Strategies for an effective reduction of Nutrient loads of the Elbe main river and its tributaries
  - *Basin wide strategies for the cost efficient reduction of nutrient loads considering point and diffuse sources*



Thank You

for your attention!