

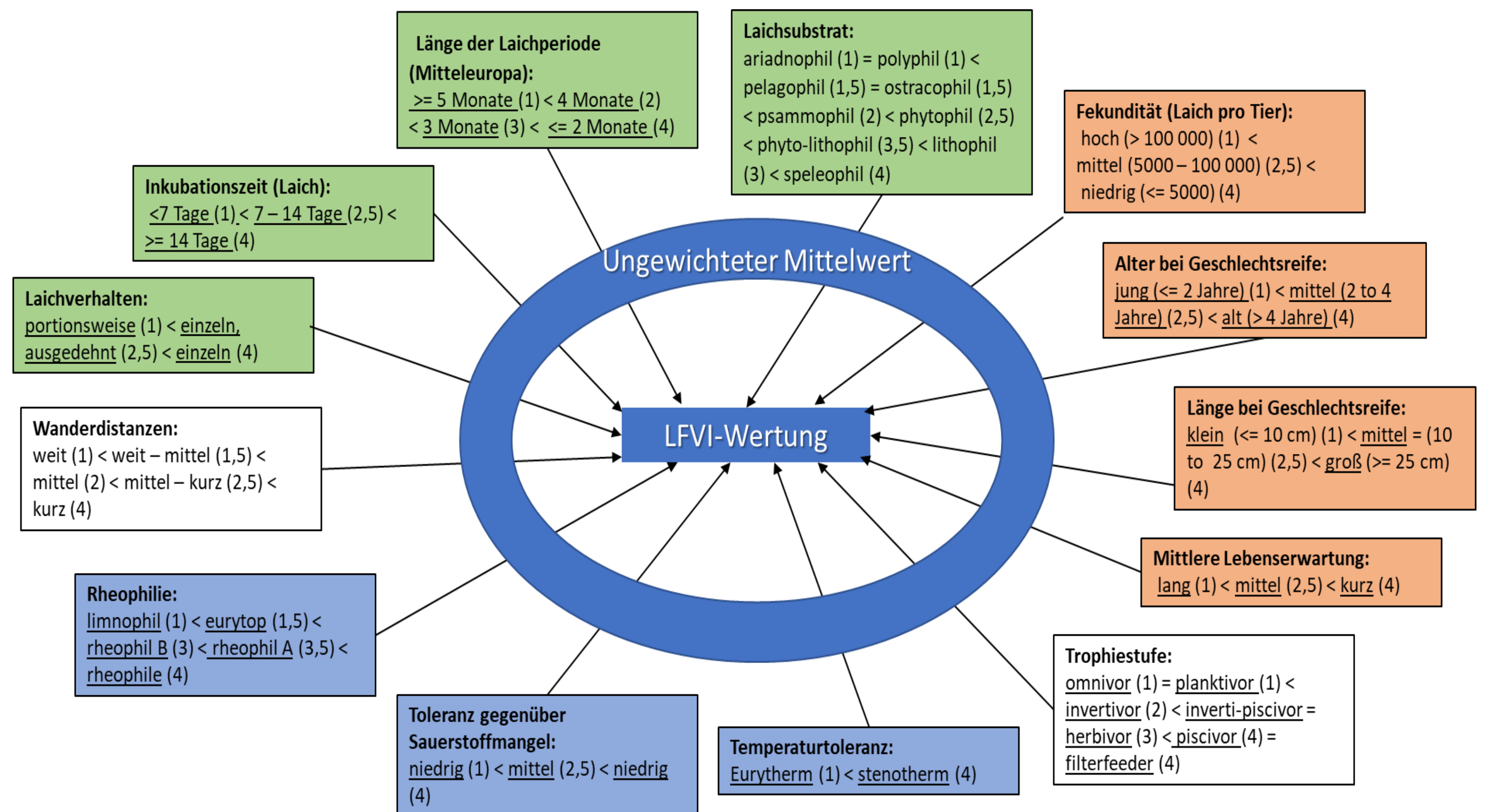
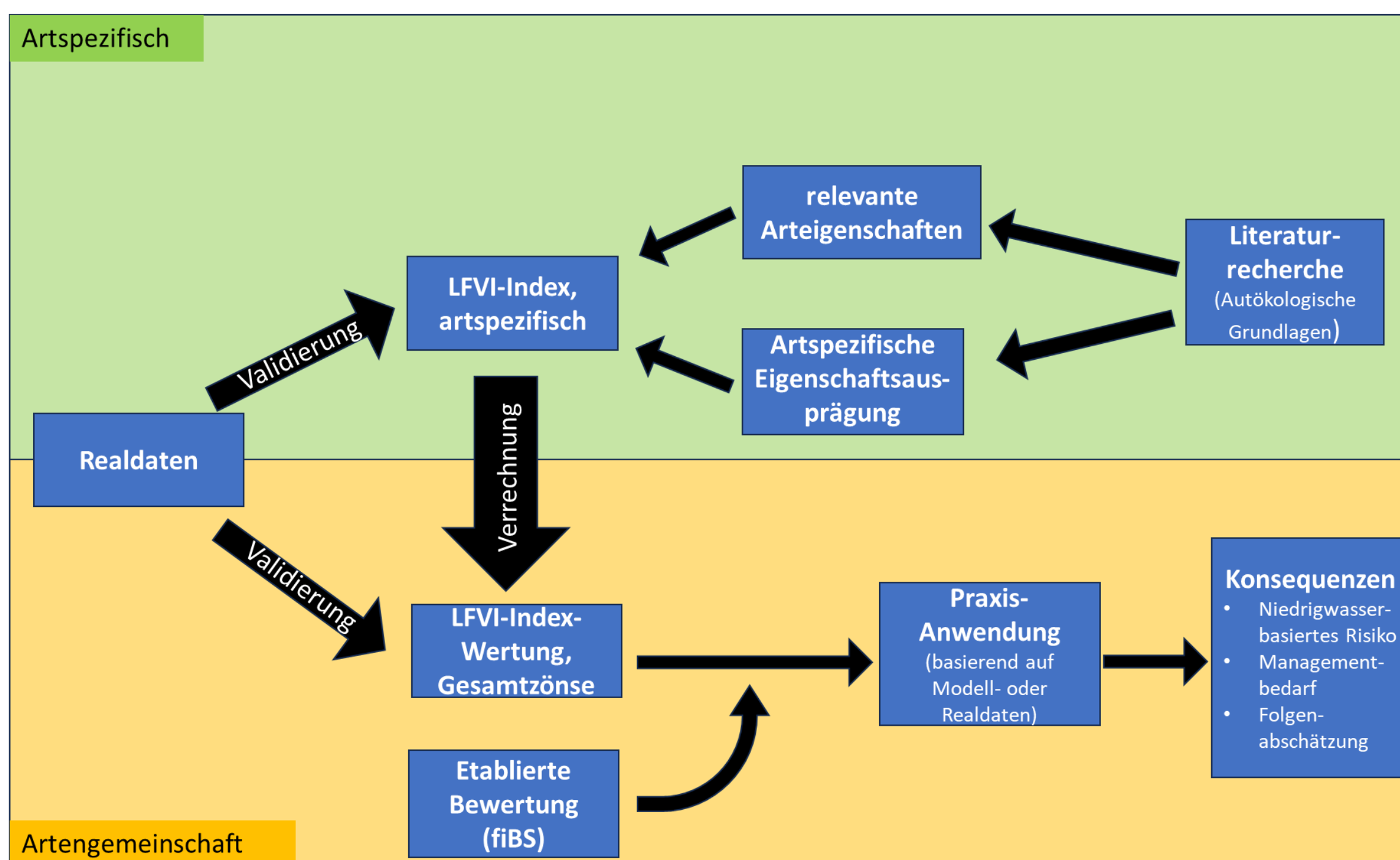
Ökologische & ökonomische Konsequenzen von Niedrigwasser (WaX-DRYRIVERS: AP 3)

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AP 3.1.1 Konsequenzen Fischfauna

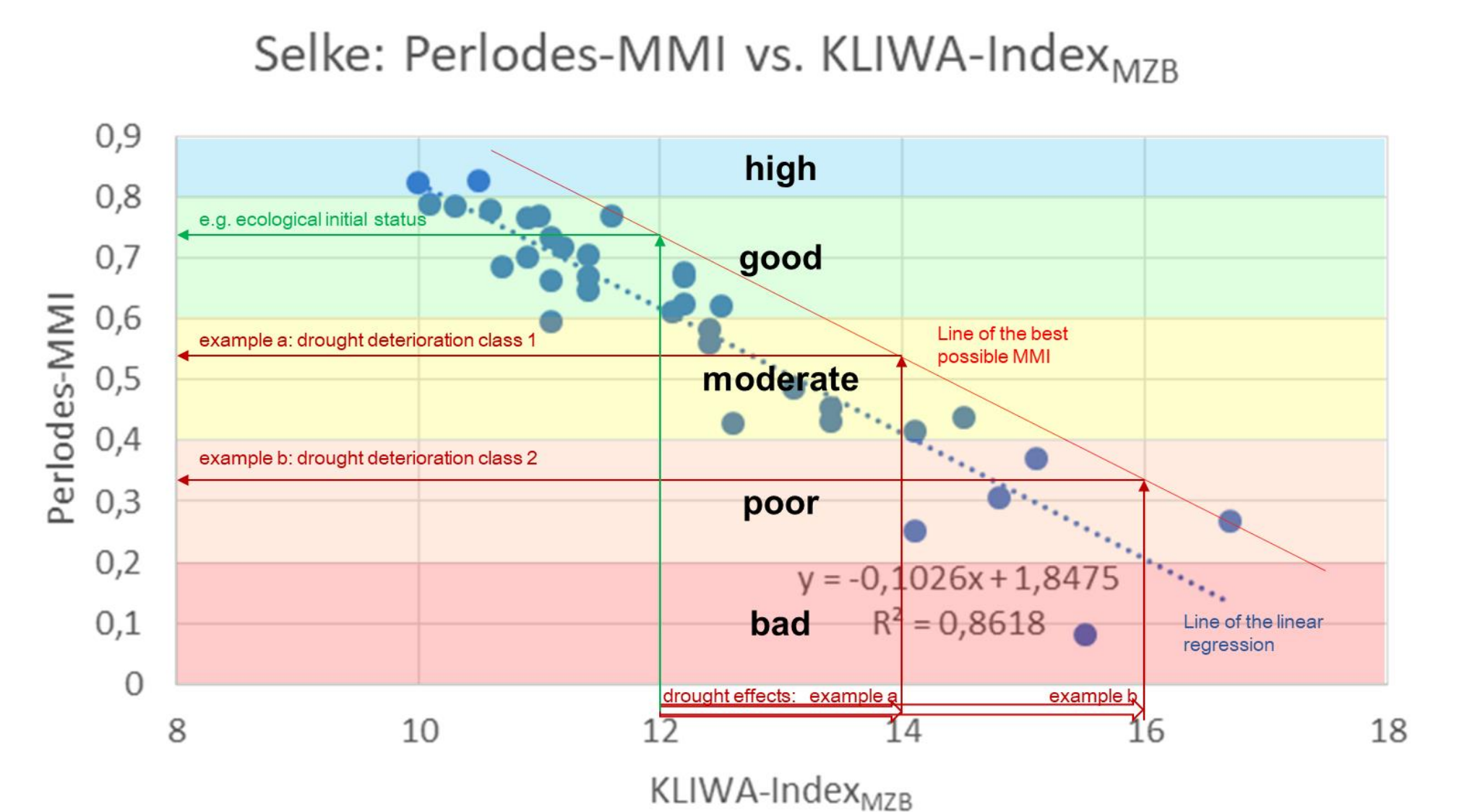
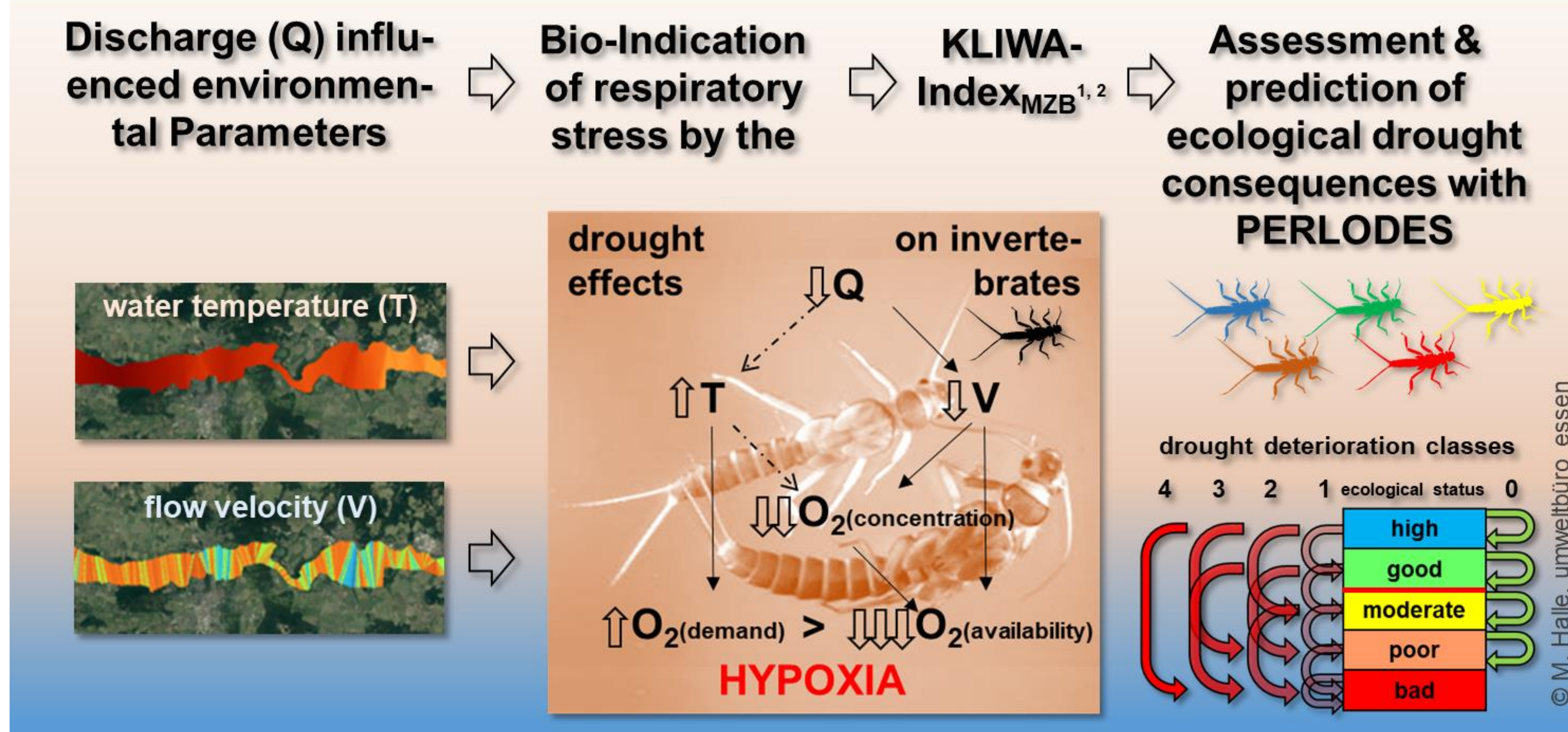
Entwicklung Low-Flow-Vulnerability-Index:
Artspezifischer autökologische Eigenschaften in Kombination mit niedrigwasserrelevanten Wirkmechanismen



AP 3.1.2 Konsequenzen Makrozoobenthos

Identifizierung, Bewertung und Prognose gewässerökologischer Konsequenzen für das Makrozoobenthos: Von den besonders maßgeblichen Niedrigwasser geprägten mess- und modellierbaren Habitatfaktoren über die Bio-Indikation respiratorischen Stresses zur Konsequenzenprognose und -bewertung für Szenarien

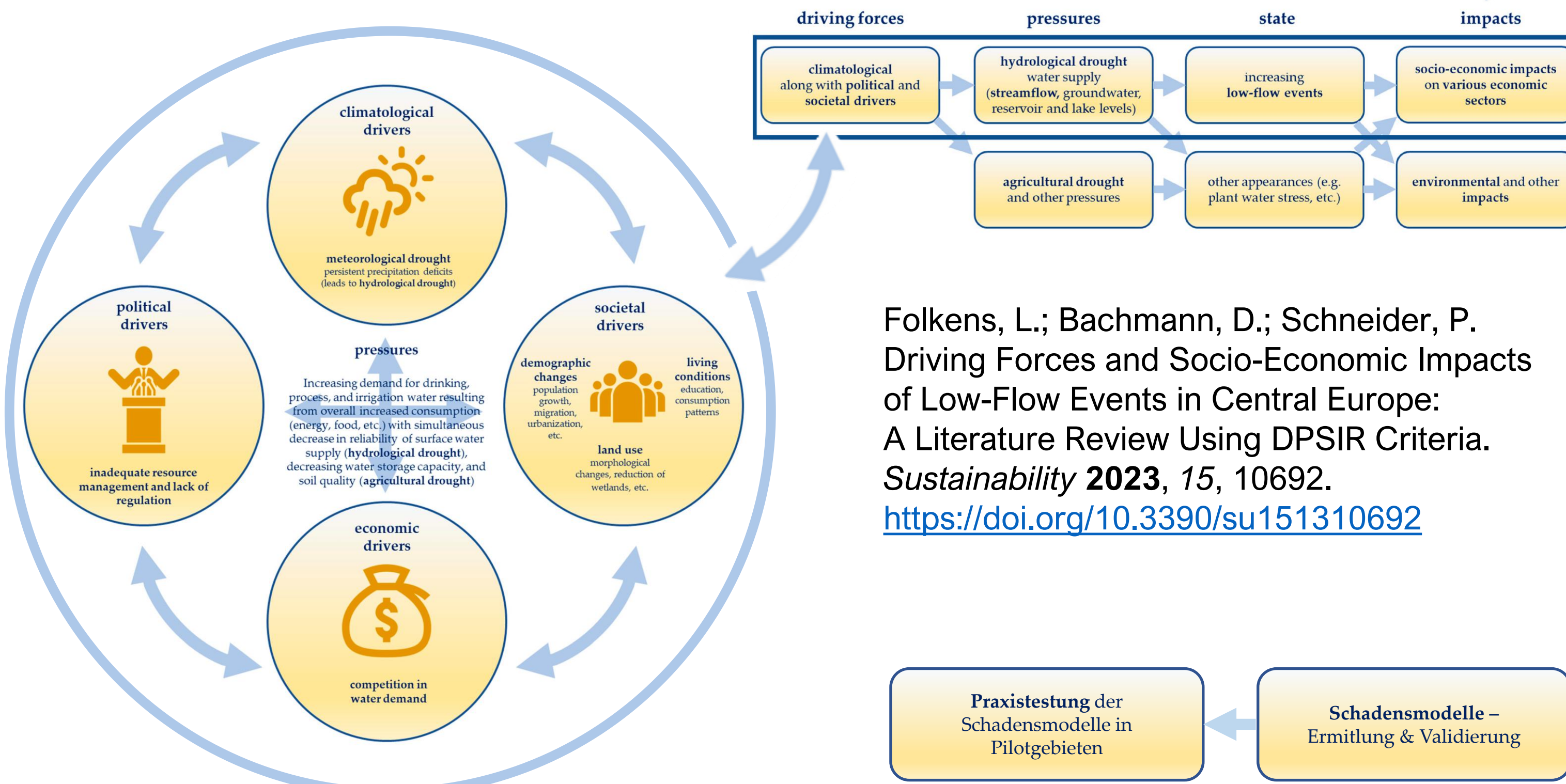
Beziehung zwischen dem KLIWA-Index_{MZB} und dem multimetrischen Bewertungsindex MMI (0 bis 1) von PERLODES am Beispiel der Selke: Je höher der KLIWA-Index_{MZB}^{1,2}, desto



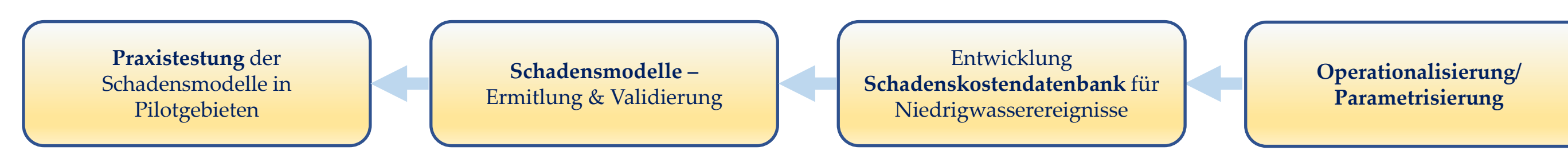
- Halle, M., Müller, A., Sundermann, A., 2016. Ableitung von Temperaturpräferenzen des Makrozoobenthos für die Entwicklung eines Verfahrens zur Indikation biozönotischer Wirkungen des Klimawandels in Fließgewässern. Heft 20. (<https://www.kliwa.de/publikationen-hefte.htm>).
- Sundermann, A., Mueller, A., Halle, M., 2022. A new index of a water temperature equivalent for summer respiration conditions of benthic invertebrates in rivers as a bio-indicator of global climate change. *Limnologia*, 95 (2022), [10.1016/j.limno.2022.125980](https://doi.org/10.1016/j.limno.2022.125980).

AP 3.2 Sozioökonomisch

Wirkungskette sozioökonomischer Konsequenzen:
Von den Treibern zu den Auswirkungen von Niedrigwasser auf sozioökonomische Nutzungen



Sector	Associated Effects	Pecuniary Effects on Economy and Society
Inland navigation	Lowering of water levels in rivers and canals makes navigation difficult or impossible [13,47,75]	Reduced transport of goods (in fact due to low fairway depths and induced by, e.g., lack of orders in case of low-flow risk) Reduced passenger transportation; limited ferry services
Tourism and recreation	Less recreational activities and tourism due to reduction in the amount of water, water level at the surface, and water quality [13,33,49,50,51] Reduced runoff and surface water levels for water-related cultural activities	Losses in the leisure and tourism industry Loss of cultural sites
Energy	Reduced flows through hydroelectric power plants or for pumped storage withdrawals [13,39,43,51] Lack of raw materials for energy production (see Inland navigation)	Production losses at hydropower and thermal power plants
Industry	Reduced discharges and surface water levels for cooling water abstraction [13,43,47,49] Reduced runoff and surface water levels for industrial abstraction (service water)	Water risk for industrial users; decline in industrial production and export earnings
Water suppliers and households	Reduced surface water levels affect mixing ratio for wastewater discharge Reduced runoff, surface water levels, and water quality for domestic and municipal withdrawals [13,33,50,75]	Increased water treatment costs for water supply from bank filtrate; increased costs for wastewater discharge Water scarcity and use restrictions for households and municipalities; losses for water utilities; insufficient water for hygiene purposes; health and well-being effects
Public and local government units	Low surface water levels lead to increased administrative burden [36]	Losses due to tax reductions and taxes on hunting and fishing licenses; lack of withdrawal fees from industrial users; administrative costs of issuing and enforcing withdrawal bans (general orders) in low-water events; costs of advertising to reduce water use
Aquatic production	Deterioration of aquatic and terrestrial habitats (as a result of increased plant stress, loss of aquatic connectivity, alteration of chemical-biological and hydrological conditions, loss of ecosystem functions) [13,35,36,47]	Reduction of aquatic production (food, medicine, cosmetics, etc.)
Agriculture and forestry ¹	Reduced soil moisture and water for irrigation and livestock supply [13,38,39,49,44,51] Increase in insect infestations, tree and plant diseases as a result of changing ecosystem processes	Damage to and reduced growth of crops or crop yields leading to loss of income for farmers and others affected; as well as a decline in food production and simultaneously rising food prices (socio-economic drought); forest losses and forest fires; dairy and livestock losses (due to reduced food and water capacity)



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