Curriculum Vitae

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	Eawag: Swiss Federal Institute
	of Aquatic Science and Technology
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Date of Birth:	June 12, 1957 in Basel, Switzerland; Swiss Citizen

Education

1981:	M.Sc. in theoretical physics, University of Basel, Switzerland.
1985:	Ph.D. in theoretical solid state physics, University of Basel, Switzerland.
	Title of thesis: "Amorphicity as Spatial Chaos " (in German).

Professional Experience

1981 - 1985:	Research and teaching assistant in theoretical physics at the University of Basel, Switzerland, and Ph.D. dissertation on the application of the theory of chaotic systems to improve the understanding of amorphous solids.
1985 - 2022:	Research scientist at the Swiss Federal Institute of Aquatic Science and Technology (Eawag), Dübendorf, Switzerland.
	(2000-2020 head of the department of Systems Analysis, Integrated Assessment and Modelling; 2005-2015 member of the directorate of Eawag)
Since 2022:	Retired from Eawag, but continuing to do research in selected projects

Teaching

1986 - 2022:	Occasional teaching in courses by Eawag for water professionals about different aspects of water management.
1991 - 2022:	Teaching at the department of Environmental Sciences of the Swiss Federal Institute of Technology (ETH), Zürich, Switzerland in systems analysis and ecological modelling.
	(1991-1995 as lecturer, 1995-2002 as "Privatdozent", since 2002 as adj. professor).
Since 2009:	Eawag Summer School on Environmental Systems Analysis
	(summer school for PhD students and researchers interested in model-based statistical data analysis with an emphasis on Bayesian techniques).

Research Fields

Systems Analysis Methodology

Development of techniques for statistical inference of model states and parameters that account for the need of using prior information and of considering input and model structure uncertainty and intrinsic stochasticity.   5 Key contributions to this field:

Reichert, P., Ammann, L. and Fenicia, F. Potential and Challenges of Investigating Intrinsic Uncertainty of Hydrological Models with Stochastic, Time-Dependent Parameters. Water Resources Research, in press 2021. https://doi.org/10.1029/2020WR028400

Kattwinkel, M. and Reichert, P. Bayesian parameter inference for Individual-Based Models using Particle Markov Chain Monte Carlo (PMCMC). *Environmental Modelling & Software* 87, 110-119, 2017. http://dx.doi.org/10.1016/j.envsoft.2016.11.001

Reichert, P. and Schuwirth, N. Linking statistical description of bias to multi-objective model calibration. *Water Resources Research*, 48, W09543, 2012. http://dx.doi.org/10.1029/2011WR011391 (open acc.)

Rinderknecht, S. L., Borsuk, M. E. and Reichert, P. Bridging Uncertain and Ambiguous Knowledge with Imprecise Probabilities, *Environmental Modelling & Software* 36, 122-130, 2012. http://dx.doi.org/10.1016/j.envsoft.2011.07.022

Rinderknecht, S.L., Borsuk, M.E. and Reichert, P. Eliciting Density Ratio Classes. *International Journal of Approximate Reasoning* 52, 792-804, 2011. http://dx.doi.org/10.1016/j.ijar.2011.02.002 (open access)

Biogeochemical and Ecological Modelling

Development and application of hydrological, biogeochemical and ecological models of river and lake systems to quantitatively describe scientific knowledge and predict effects of changes in driving forces and of management measures. 5 Key contributions to this field:

Schuwirth, N. and Reichert, P. Bridging the gap between theoretical ecology and real ecosystems: modeling invertebrate community composition in streams, *Ecology* 94(2), 368-379, 2013. http://dx.doi.org/10.1890/12-0591.1

Reichert, P. and Schuwirth, N., A generic framework for deriving process stoichiometry in environmental models, *Environmental Modelling & Software*, 25, 1241-1251, 2010. http://dx.doi.org/10.1016/j.envsoft.2010.03.002

Reichert, P., Uehlinger, U. and Acuña V., Estimating stream metabolism from oxygen concentrations: The effect of spatial heterogeneity, *Journal of Geophysical Research* 114, G03016, 2009. http://dx.doi.org/10.1029/2008JG000917 (open access)

Reichert, P., Borchardt, D., Henze, M., Rauch, W., Shanahan, P., Somlyódy, L. and Vanrolleghem, P., River Water Quality Model no. 1 (RWQM1): II. Biochemical process equations, *Water Sci. Tech.* 43(5), 11-30, 2001. http://wst.iwaponline.com/content/43/5/11 (open access)

Omlin, M., Reichert, P. and Forster, R., Biogeochemical model of lake Zürich: Model equations and results, *Ecological Modelling* 141(1-3), 77-103, 2001. http://dx.doi.org/10.1016/S0304-3800(01)00256-3

Environmental Decision Support

Design and apply decision analytical procedures to quantify societal preferences and apply them jointly with scientific predictions of outcomes of management alternatives in environmental decision support. 5 Key contributions to this field:

Reichert, P. Towards a comprehensive uncertainty assessment in environmental research and decision support. Water Science & Technology 81(8), 1588–1596, 2020. https://doi.org/10.2166/wst.2020.032

Kuemmerlen, M., Reichert, P., Siber, R. and Schuwirth, N. Ecological assessment of river networks: From reach to catchment scale. *Science of the Total Environment* 650, 1613-1627, 2019. http://dx.doi.org/10.1016/j.scitotenv.2018.09.019

Haag, F., Lienert, J., Schuwirth, N. and Reichert, P. Identifying non-additive multi-attribute value functions based on uncertain indifference statements. *Omega* 85, 49-67, 2019. http://dx.doi.org/10.1016/j.omega.2018.05.011

Reichert, P., Langhans, S., Lienert, J. and Schuwirth, N. The Conceptual Foundation of Environmental Decision Support. *Journal of Environmental Management* 154, 316-332, 2015. http://dx.doi.org/10.1016/j.jenvman.2015.01.053 (open access)

Reichert, P. and Borsuk, M.E., Does high forecast uncertainty preclude effective decision support?, *Environmental Modelling and Software* 20(8), 991-1001, 2005. http://dx.doi.org/10.1016/j.envsoft.2004.10.005

Publications

Software (see also https://gitlab.com/p.reichert)

- R package for constructing, evaluating and plotting objective hierarchies and associated value and utility functions. R package utility
- R package for reading, analysing and plotting river networks. R package rivernet
- Contributions to R package for evaluating and visualizing ecological assessment procedures for surface waters containing physical, chemical and biological assessments in the form of value functions. R package ecoval
- R package for calculating stoichiometric coefficients from substance composition, list of involved substances, and additional constraints. R package stoichcalc
- R package for implementing, simulating and visualizing results of (didactical) biogeochemical and ecological models. R package ecosim
- R package for Bayesian inference with time-dependent, stochastic parameters. R package timedeppar
- R code for implementing simple, conceptual hydrological models. R code conhydmod

Publications for Practice

- Känel, B., Michel, C. and Reichert, P. Methoden zur Untersuchung und Beurteilung der Fliessgewässer. Makrophyten - Stufe F (flächendeckend) und Stufe S (systembezogen). Entwurf. Bundesamt für Umwelt, Bern. Umwelt-Vollzug, 119 S. 2017.
- Niederberger K., Rey P., Reichert P., Schlosser J., Helg, U., Haertel-Borer S., Binderheim E. *Methoden zur Untersuchung und Beurteilung der Seen. Modul: Ökomorphologie Seeufer*. Bundesamt für Umwelt, Bern. Umwelt-Vollzug Nr. 1632: 73 S. 2016. http://www.bafu.admin.ch/uv-1632-d
- Schlosser J. A., Haertel-Borer S., Liechti P. and Reichert P. *Konzept für die Untersuchung und Beurteilung der Seen in der Schweiz*. Anleitung zur Entwicklung und Anwendung von Beurteilungsmethoden. Bundesamt für Umwelt, Bern. Umwelt-Wissen Nr. 1326: 38 S. 2013. http://www.bafu.admin.ch/uw-1326-d
- Baumgartner, S., Peter, A., Reichert, P., Robinson, C., Siegenthaler-Le Drian, C., Thomas, G. *Priorisierung von Flussrevitalisierungsprojekten – ökologische Aspekte der Priorisierung und Revitalisierungspotential*. Eawag, 2013.
- Langhans, S. D. and Reichert, P., Einbettung von Verfahren zur Fliessgewässerbewertung in ein übergeordnetes Gewässermanagementkonzept – Vorschläge am Beispiel des Modustufenkonzepts. *Wasser Energie Luft* 103(3), 204-214, 2011.
- Reichert, P., Schuwirth, N. und Langhans, S.D. MCWM – Ein Konzept für multikriterielle Entscheidungs-unterstützung im Wassermanagement. *Wasser Energie Luft* 103(2), 139-148, 2011.

Articles in peer-reviewed journals and book chapters

- Palamara, G. M., Dennis, S. R., Haenggi, C., Schuwirth, N. and Reichert, P. Investigating the effect of pesticides on Daphnia population dynamics by inferring structure and parameters of a stochastic model. Ecological Modelling, in review, 2022
- Bacci, M., Dal Molin, M., Fenicia, F., Reichert, P. and Sukys, J. Application of stochastic time dependent parameters to improve the characterization of uncertainty in conceptual hydrological models. Journal of Hydrology, accepted, 2022. https://doi.org/10.1016/j.jhydrol.2022.128057
- Ammann, L., Stamm, C., Fenicia, F. and Reichert, P. Quantifying the uncertainty of a conceptual herbicide transport model with time-dependent, stochastic parameters. Water Resources Research 57(8), e2020WR028311, 2021. https://doi.org/10.1029/2020WR028311
- Vermeiren, P., Reichert, P., Graf, W., Leitner, P., Schmidt-Kloiber, A., Schuwirth, N. Confronting existing knowledge on ecological preferences of stream macroinvertebrates with independent monitoring data using a Bayesian multi-species distribution model. Freshwater Science 40(1), 202–220, 2021. https://doi.org/10.1086/713175
- Reichert, P., Ammann, L. and Fenicia, F. Potential and Challenges of Investigating Intrinsic Uncertainty of Hydrological Models with Stochastic, Time-Dependent Parameters. Water Resources Research 57(3), e2020WR028400, 2021. https://doi.org/10.1029/2020WR028400
- Caradima, B., Reichert, P. and Schuwirth, N. Effects of site selection and taxonomic resolution on the inference of stream invertebrate responses to environmental conditions. Freshwater Science 39(3), 415-432, 2020. https://doi.org/10.1086/709024
- Ammann, L., Doppler, T., Stamm, S., Reichert, P. and Fenicia, F. Characterizing fast herbicide transport in a small agricultural catchment with conceptual models. Journal of Hydrology 586, 2020. https://doi.org/10.1016/j.jhydrol.2020.124812
- Reichert, P. Towards a comprehensive uncertainty assessment in environmental research and decision support. *Water Science & Technology* 81(8), 1588–1596, 2020. https://doi.org/10.2166/wst.2020.032
- Vermeiren, P., Reichert, P. and Schuwirth, N. Integrating uncertain prior knowledge regarding ecological preferences into multi-species distribution models: Effects of model complexity on predictive performance. *Ecological Modelling* 420, 2020. https://doi.org/10.1016/j.ecolmodel.2020.108956
- Reichert, P., Niederberger, K., Rey, P., Helg, U. and Haertel-Borer, S. The need for unconventional value aggregation techniques: experiences from eliciting stakeholder preferences in environmental management. *Euro Journal on Decision Processes* 7, 197–219, 2019. https://doi.org/10.1007/s40070-019-00101-9
- Haag, F., Reichert, P., Maurer, M. and Lienert, J. Integrating uncertainty in preferences and predictions in decision models: An application to regional wastewater planning. *Journal of Environmental Management* 252, 109652, 2019. https://doi.org/10.1016/j.jenvman.2019.109652
- Caradima, B., Schuwirth, N. and Reichert, P. From individual to joint species distribution models: a comparison of model complexity and predictive performance. *Journal of Biogeography* 46(19), 2260-2274, 2019. https://doi.org/10.1111/jbi.13668

- Ammann, L., Fenicia, F. and Reichert, P. A likelihood framework for deterministic hydrological models and the importance of non-stationary autocorrelation. *Hydrol. Earth Syste. Sci.* 23, 2147–2172, 2019. https://doi.org/10.5194/hess-23-2147-2019 (open access)

- Kuemmerlen, M., Reichert, P., Siber, R. and Schuwirth, N. Ecological assessment of river networks: From reach to catchment scale. *Science of the Total Environment* 650, 1613-1627, 2019. http://dx.doi.org/10.1016/j.scitotenv.2018.09.019

- Haag, F., Lienert, J., Schuwirth, N. and Reichert, P. Identifying non-additive multi-attribute value functions based on uncertain indifference statements. *Omega* 85, 49-67, 2019. http://dx.doi.org/10.1016/j.omega.2018.05.011

- Machac, D., Reichert, P., Rieckermann, J., Del Giudice, D. and Albert, C. Accelerating Bayesian inference in hydrological modeling with a mechanistic emulator. *Environmental Modelling & Software* 109, 66-79, 2018. http://dx.doi.org/10.1016/j.envsoft.2018.07.016

- Kavetski, D., Fenicia, F., Reichert, P. and Albert, C. Signature-domain calibration of hydrological models using approximate Bayesian computation: Theory and comparison to existing applications. *Water Resources Research* 54, 4059-4083, 2018. http://dx.doi.org/10.1002/2017WR020528

- Fenicia, F., Kavetski, D., Reichert, P. and Albert, C. Signature-domain calibration of hydrological models using approximate Bayesian computation: Empirical analysis of fundamental properties. *Water Resources Research* 54, 3958-3987, 2018. http://dx.doi.org/10.1002/2017WR021616

- Kattwinkel, M. and Reichert, P. Bayesian parameter inference for Individual-Based Models using Particle Markov Chain Monte Carlo (PMCMC). *Environmental Modelling & Software* 87, 110-119, 2017. http://dx.doi.org/10.1016/j.envsoft.2016.11.001

- Paillex, A., Reichert, P., Lorenz, A.W. and Schuwirth, N. Mechanistic modelling for predicting the effects of restoration, invasion and pollution on benthic macroinvertebrate communities in rivers. *Freshwater Biology* 62, 1083–1093, 2017. http://dx.doi.org/10.1111/fwb.12927

- Paillex, A., Schuwirth, N., Lorenz, A.W., Januschke, K., Peter, A. and Reichert, P. Integrating and extending ecological river assessment: Concept and test with two restoration projects. *Ecological Indicators*. 72, 131-141, 2017. http://dx.doi.org/10.1016/j.ecolind.2016.07.048

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- Machac, D., Reichert, P. and Albert, C. Emulation of dynamic simulators with application to hydrology. *Journal of Computational Physics* 313, 352-366, 2016. http://dx.doi.org/10.1016/j.jcp.2016.02.046

- Kattwinkel, M., Reichert, P., Rüegg, J., Liess, M. and Schuwirth, N. Modelling macroinvertebrate community dynamics in stream mesocosms contaminated with pesticide. *Environmental Science & Technology* 50, 3165−3173, 2016. http://dx.doi.org/10.1021/acs.est.5b04068

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- Schuwirth, N., Dietzel, A. and Reichert, P. The importance of biotic interactions for the prediction of macroinvertebrate communities under multiple stressors. *Functional Ecology* 30, 974–984, 2015. http://dx.doi.org/10.1111/1365-2435.12605 (open access)

- Scholten, L., Schuwirth, N., Reichert, P. and Lienert, J. Tackling uncertainty in multi-criteria decision analysis – An application to water supply infrastructure planning. *European Journal of Operational Research* 242(1), 243-260, 2015. http://dx.doi.org/10.1016/j.ejor.2014.09.044

- Reichert, P., Langhans, S., Lienert, J. and Schuwirth, N. The Conceptual Foundation of Environmental Decision Support. *Journal of Environmental Management* 154, 316-332, 2015. http://dx.doi.org/10.1016/j.jenvman.2015.01.053 (open access)

- Del Giudice, D., Reichert, P., Bares, V., Albert, C. and Rieckermann, J. Model bias and complexity – Understanding the effects of structural deficits and input errors on runoff predictions. *Environmental Modelling & Software* 64, 205-214, 2015. http://dx.doi.org/10.1016/j.envsoft.2014.11.006

- Rinderknecht, S.L., Albert, C., Borsuk, M.E., Schuwirth, N., Künsch, H.R. and Reichert, P. The effect of ambiguous prior knowledge on Bayesian model parameter inference and prediction. *Environmental Modelling & Software*. 62, 300-315, 2014. http://dx.doi.org/10.1016/j.envsoft.2014.08.020

- Dietzel, A. and Reichert, P. Bayesian inference of a lake water quality model by emulating its posterior density. *Water Resources Research* 50, 7626-7647, 2014. http://dx.doi.org/10.1002/2012WR013086

- Reichert, C., Reichert, P., Monnet-Tschudi, F., Kupferschmidt, H., Ceschi, A., and Rauber-Lüthy, C. Seizures after single-agent overdose with pharmaceuticals: Analysis of cases reported to a poison centre. *Clinical Toxicology* 52(6), 629-634, 2014. http://dx.doi.org/10.3109/15563650.2014.918627

- Langhans, S.D., Reichert, P. and Schuwirth, N. The method matters: A guide for indicator aggregation in ecological assessments. *Ecological Indicators* 45, 494-507, 2014. http://dx.doi.org/10.1016/j.ecolind.2014.05.014

- Scholten, L., Scheidegger, A., Reichert, P., Maurer, Max and Lienert, J. Strategic rehabilitation planning of piped water networks using multi-criteria decision analysis. *Water Research* 49, 124-143, 2014. http://dx.doi.org/10.1016/j.watres.2013.11.017

- Egger, C., Scheidegger, A., Reichert, P. and Maurer, M. Sewer deterioration modeling with condition data lacking historical records. *Water Research* 47, 6762-6779, 2013. http://dx.doi.org/10.1016/j.watres.2013.09.010

- Del Giudice, D., Honti, M., Scheidegger, A., Albert, C., Reichert, P. and Rieckermann, J. Improving uncertainty estimation in urban hydrological modeling by statistically describing bias. *Hydrol. Earth Syste. Sci.* 17, 4209–4225, 2013. http://dx.doi.org/10.5194/hess-17-4209-2013 (open access)

- Honti, M., Stamm, C. and Reichert, P., Integrated uncertainty assessment of discharge predictions with a statistical error model, *Water Resources Research*, 49, 4866–4884, 2013. http://dx.doi.org/10.1002/wrcr.20374

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- Scheidegger, A., Scholten, L., Maurer, M. and Reichert, P. Extension of pipe failure models to consider the absence of data from replaced pipes, *Water Research* 47, 3696-3705, 2013. http://dx.doi.org/10.1016/j.watres.2013.04.017

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- Schuwirth, N. and Reichert, P. Bridging the gap between theoretical ecology and real ecosystems: modeling invertebrate community composition in streams, *Ecology* 94(2), 368-379, 2013. http://dx.doi.org/10.1890/12-0591.1

- Dietzel, A., Mieleitner, J., Kardaetz, S. and Reichert, P. Effects of changes in the driving forces on water quality and plankton dynamics in three Swiss lakes - long-term simulations with BELAMO. *Freshwater Biology* 58, 10–35, 2013. http://dx.doi.org/10.1111/fwb.12031

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- Borsuk, M.E., Schweizer, S. and Reichert, P. A probability network model for integrative river rehabilitation planning and management. *Integrated Environmental Assessment and Management* 8(3), 462-472, 2012. http://dx.doi.org/10.1002/ieam.233 (open access)

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- Hering, J.G., Hoehn, E., Klinke, A., Maurer, M., Peter, A., Reichert, P., Robinson, C., Schirmer, K., Schirmer, M., Stamm, C. and Wehrli, B. Moving targets, long-lived infrastructure, and increasing needs for integration and adaptation in water management: An illustration from Switzerland. *Environmental Science & Technology* 46(1), 112-118, 2012. http://dx.doi.org/10.1021/es202189s (open access)

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- Albert, C., Ashauer, R., Künsch, H.R., Reichert, P., Bayesian experimental design for a toxicokinetic-toxicodynamic model. *Journal of Statistical Planning and Inference* 142, 263-275, 2012. http://dx.doi.org/10.1016/j.jspi.2011.07.014

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- Tomassini, L., Reichert, P., Künsch, H.-R. Buser, C., Knutti, R. and Borsuk, M.E., A smoothing algorithm for estimating stochastic, continuous-time model parameters and its application to a simple climate model, *Journal of the Royal Statistical Society: Series C (Applied Statistics)* 58, 679-704, 2009. http://dx.doi.org/10.1111/j.1467-9876.2009.00678.x
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