

## Acknowledgements

Many people have contributed to this book. Most of the experiments that form the foundation for this book were carried out at the TNO Laboratories in Den Helder, The Netherlands, under the supervision of Edwin Foekema and Robbert Jak. The authors would like to thank everyone who has contributed to these experiments: Gerrit Hoornsman, Liesbeth van der Vlies, Dennis van der Veen, Sherri Huwer, Wendy Koegelberg, Marijke van der Meer and Henk van het Groenewoud. This book would not have been possible without their continuous effort and enthusiasm.

The experimental work was carried out in close co-operation with the University of Alicante, Spain, and the Université de Savoie (ESIGEC). The authors extend their gratitude to Dr. Daniel Prats, Dr. Pilar Hernandez, Juan Carlos Asensi, Mari José Navarro, Laura Rull, Dr. Gérard Blake and Dr. Bernard Clement for their contributions and for the stimulating discussions.

The authors are much indebted to a group of experts who were willing to invest their time and knowledge in providing commentary on the first draft of this manuscript in a 3-day peer-review workshop (December 1999) in Callantsoog (the Netherlands): Donald Baird (University of Stirling, UK), Gérard Blake (ESIGEC, France), Bernard Clement (ENTPE, France), John Driver (Albright and Wilson, UK), Pilar Hernandez (University of Alicante, Spain), Brian Moss (University of Liverpool, UK), Sergei Oestromov (State University of Moscow, Russia), Hans Toni Ratte (Aachen University of Technology, Germany), Loreto Rossi (University of Rome "La Sapienza", Italy), Nico van Straalen (Free University of Amsterdam, the Netherlands), Chris Thornton (CEFIC-CEEP, Belgium) and Frans Visser. Their contributions were invaluable to the focussing of this book.

Last but not least, the authors thank CEFIC – CEEP and the Dutch Ministry of Transport and Water Management (RWS-RIZA) for their financial support and Springer Verlag (Wim Salomons) for their continuous support and enthusiasm.

Martin Scholten, Research Coordinator

## References

- Allan JD (1976) Life history patterns in zooplankton. *Am Nat* 110:165–180
- Andersen T (1997) Pelagic nutrient cycles. Herbivores as sources and sinks. *Ecological Studies* 129, Springer-Verlag, Berlin.
- Andersson G, Granéli W, Stenson J (1988) The influence of animals on phosphorus cycling in lake ecosystems. *Hydrobiologia* 170:267–284
- Anonymous (1994) Hydrobiologisch onderzoek Amstelmeerboezem. Hoogheemraadschap van de Uitwaterende Sluizen in Kennemerland en Westfriesland
- AquaSense (1996) Bestrijding van eutrofiering in de Geestmerambachtplas. Deelonderzoek: inventarisatie fysische en biologische parameters tbv eutrofieringsonderzoek. Commissioned by: Waterloopkundig Laboratorium. Report number 96.0448
- Baird DJ, Barber I, Bradley M, Soares AMVM, Calow P (1991) A comparative study of genotype sensitivity to acute toxic stress using clones of *Daphnia magna* Straus. *Ecotoxicol Environ Saf* 21:257–265
- Bales M, Moss B, Phillips G, Irvine K, Stansfield J (1993) The changing ecosystem of a shallow, brackish lake, Hickling Broad, Norfolk, UK. II. Long-term trends in water chemistry and ecology and their implications for restoration of the lake. *Freshwater Biol* 29:141–165
- Barnes RSK, Mann KH (1993) *Fundamentals of aquatic ecology*. Blackwell Scientific Publications. Oxford. 2<sup>nd</sup> ed
- Baudo R (1987) Ecotoxicological testing with *Daphnia*. In: Peters RH, De Bernardi R (eds) *Daphnia*. *Mem Ist Ital Idrobiol* 45:461–482
- Beklioglu M, Moss B (1995) The impact of pH on interactions among phytoplankton algae, zooplankton and perch (*Perca fluviatilis*) in a shallow, fertile lake. *Freshwater Biol* 33:497–509
- Benndorf J (1990) Conditions for effective biomanipulation; conclusions derived from whole-lake experiments in Europe. *Hydrobiologia* 200/201:187–203
- Bleiker W, Schanz F (1997) Light climate as the key factor controlling the spring dynamics of phytoplankton in Lake Zürich. *Aquat Sci* 59:135–157
- Blockwell SJ, Taylor EJ, Jones I, Pascoe D (1998) The influence off fresh water pollutants and interaction with *Asellus aquaticus* (L) on the feeding activity of *Gammarus pulex* (L). *Arch Environ Contam Toxicol* 34:41–47
- Burns CW, Schallenberg M (1998) Impacts of nutrients and zooplankton on the microbial food web of an ultra-oligotrophic lake. *J Plankton Res* 20:1501–1525
- Burns CW (1968) The relationship between body size of filter-feeding cladocera and the maximum size of particle ingested. *Limnol Oceanogr* 13:675–678
- Butler NM, Suttle CA, Neill WE (1989) Discrimination by freshwater zooplankton between single algal cells differing in nutritional status. *Oecologia* 78:368–372
- Cairns J, Cherry DS (1993) Freshwater multi-species test systems. In: Calow P (ed) *Handbook of ecotoxicology*. Vol 1. Blackwell Scientific Publications, Oxford. pp. 101–116
- Carpenter SR, Kitchell JF (1993) Experimental lakes, manipulations and measurements. In: Carpenter SR, Kitchell JF (eds) *The trophic cascade in lakes*. Cambridge University Press. pp. 15–25

- Carpenter SR (1993) Statistical analysis of the ecosystem experiments. In: Carpenter SR, Kitchell JF (eds) *The trophic cascade in lakes*. Cambridge University Press. pp. 26–42
- Carpenter SR, Bolgrien D, Lathrop RC, Stow CA, Reed T, Wilson MA (1998) Ecological and economic analysis of lake eutrophication by nonpoint pollution. *Austr J Ecol* 23:68–79
- Carpenter SR, Christensen DL, Cole JJ, Cottingham KL, He X, Hodgson JR, Kitchell JF, Knight SE, Pace ML, Post DM, Schindler DE, Voichick N (1995a) Biological control of eutrophication in lakes. *Environ Sci Technol* 29:784–786
- Carpenter SR, Kitchell JF, Hodgson JR (1985) Cascading trophic interactions and lake productivity. *BioScience* 35:634–639
- Carpenter SR, Kitchell JF, Hodgson JR, Cochran PA, Elser JJ, Elser MM, Lodge DM, Kretchmer D, He X, Von Ende CN (1987) Regulation of lake primary productivity by food web structure. *Ecology* 68:1863–1876
- Carpenter SR, Cottingham KL, Schindler DE (1992) Biotic feedbacks in lake phosphorus cycles. *TREE* 7:332–336
- Carpenter SR, Chrisholm SW, Krebs CJ, Schindler DW, Wright RF (1995b) Ecosystem experiments. *Science* 269:324–327
- Chorus I, Bartram J (eds) (1999) *Toxic cyanobacteria in water. A guide to their public health consequences, monitoring and management*. E & FN Spon, London
- Colbourne JK, Hebert PDN (1996) The systematics of North American *Daphnia* (Crustacea, Anomopoda): a molecular phylogenetic approach. *Phil Trans Roy Soc Lond B* 351(1337):349–360
- Currie DJ, Dilworth-Christie P, Chapleau F (1999) Assessing the strength of top-down influences on plankton abundance in unmanipulated lakes. *Can J Fish Aquat Sci* 56(3):427–436.
- CUWVO (1976) Schets van de eutrofiëringssituatie van het Nederlandse oppervlaktewater en overzicht van de onderzoeksactiviteiten van de verschillende waterkwaliteitsbeheerders. Resultaten van de eerste eutrofiëringssenquete. Coördinatiecommissie Uitvoering Wet Verontreiniging Oppervlaktewateren, Werkgroep VI
- CUWVO (1980) Ontwikkeling van grenswaarden voor doorzicht, chlorophyl, fosfaat en stikstof. Resultaten van de tweede eutrofiëringssenquete, november 1980. Coördinatiecommissie Uitvoering Wet Verontreiniging Oppervlaktewateren, Werkgroep VI
- CUWVO (1988) Samenvatting en conclusie van het vergelijkend onderzoek naar de eutrofiëring in Nederlandse meren en plassen. Resultaten van de derde eutrofiëringssenquete. Coördinatiecommissie Uitvoering Wet Verontreiniging Oppervlaktewateren Werkgroep VI. 26 pp.
- Day KE (1989) Acute, chronic and sublethal effects of synthetic pyrethroids on freshwater zooplankton. *Environ Toxicol Chem* 8:411–416
- De Bernardi R, Giussani G (1990) Are blue-green algae a suitable food for zooplankton? An overview. *Hydrobiologia* 200/201:29–41
- De Bruijn J, Crommentuijn T, Van Leeuwen K, Van der Plassche E, Sijm D, Van der Weiden M (1999) Environmental risk limits in the Netherlands. RIVM report No 601640001
- DeMott WR (1998) Utilization of a cyanobacterium and a phosphorus-deficient green alga as complementary resources by daphnids. *Ecology* 79(7):2463–2481
- deNoyelles F, Dewey SL, Huggings DG, Kettle WD (1994) Aquatic mesocosms in ecological effects testing: Detecting direct and indirect effects of pesticides. In: Graney RL, Kennedy JH, Rodgers JH (eds) *Aquatic mesocosm studies in ecological risk assessment*. SETAC Special Publication. Lewis Publishers, Boca Raton pp 577–603
- Elser JJ, Urabe J (1999) The stoichiometry of consumer-driven nutrient recycling: theory, observations, and consequences. *Ecology* 80(3):735–751
- Enserink EL (1995) Food mediated life history strategies in *Daphnia magna*: Their relevance to ecotoxicological evaluations. Thesis Agricultural University Wageningen

- Fernández-Casalderrey A, Ferrando MD, Andreu-Moliner E (1993) Effect of the insecticide methylparathion on filtration and ingestion rates of *Brachionus calyciflorus* and *Daphnia magna*. *Sci Total Environ Suppl*:867–876
- Fernández-Casalderrey A, Ferrando MD, Andreu-Moliner E (1994) Effect of sublethal concentrations of pesticides on the feeding behavior of *Daphnia magna*. *Ecotoxicol Environ Saf* 27:82–89
- Fisher TR, Melack JM, Grobbelaar JU, Howarth RW (1995) Nutrient limitation of phytoplankton and eutrophication of inland, estuarine, and marine waters. In: Tiessen H (ed) *Phosphorus in the global environment*. Scope 54, John Wiley & Sons, Chichester pp. 301–322
- Flickinger AL, Bruins RJF, Winner RW, Skillings JH (1982) Filtration and phototactic behavior as indices of chronic copper stress in *Daphnia magna* Straus. *Arch Environ Contam Toxicol* 11:457–463
- Fliedner A (1997) Ecotoxicity of poorly water-soluble substances. *Chemosphere* 35:295–305
- Foekema EM, Van Dokkum HP (2000) Evaluatie van de blauwalgenbloei in de geestmerambachtplas in 1999. TNO report TNO-MEP R2000/177
- Foekema EM, Kaag NHBM, Van Hussen DM, Jak RG, Scholten MCTh, Van de Guchte C (1998) Mesocosm observations on the ecological response of an aquatic community to sediment contamination. *Water Sci Technol* 37(6–7):249–256
- Foekema EM, Jak RG, Scholten MCTh (1996) Toetsing van enkele veldexperimenten in microcosms behandeld met dimethoaat. TNO report TNO-MEP R96/070
- Galloway JN (1998) The global nitrogen cycle: changes and consequences. *Environ Pollut* 102(Suppl 1):15–24
- Gliwicz MZ, Sieniawska A (1986) Filtering activity of *Daphnia* in low concentrations of a pesticide. *Limnol Oceanogr* 31:1132–1138
- Gliwicz ZM (1990) Food thresholds and body size in cladocerans. *Nature* 343:638–640
- Goldman JC (1979) Temperature effects on steady-state growth, phosphorus uptake, and the chemical composition of a marine phytoplankton. *Microbial Ecol* 5:153–166
- Golterman HL (1977) Sediments as a source of phosphate for algal growth. In: HL Golterman (ed), *Interactions between sediments and freshwater*. Dr W Junk Publishers, The Hague-Pudoc, Wageningen pp. 286–293
- Golterman HL (1991) Reflections on post-OECD eutrophication models. *Hydrobiologia* 218:167–176
- Gommers P, Rienks J, Wagemaker FH (1999) Gezuiverde cijfers over zuiveren. RWS RIZA report 99.018
- Gosselain V, Viroux L, Descy JP (1998) Can a community of small-bodied grazers control phytoplankton in rivers? *Freshwater Biol* 39:9–24
- Goulden CE, Henry LL, Tessier AJ (1982) Body size, energy reserves, and competitive ability in three species of cladocera. *Ecology* 63:1780–1789
- Grobbelaar JU, House WA (1995) Phosphorus as a limiting resource in inland waters; interactions with nitrogen. In: Tiessen H (ed) *Phosphorus in the global environment*. Scope 54, John Wiley, Sons, Chichester. pp. 255–273
- Grobbelaar JU (1983) Availability to algae of N and P adsorbed on suspended solids in turbid waters of the Amazon river. *Arch Hydrobiol* 96(3):302–316
- Grootelaar EMM, Maas-Diepeveen JL (1988) Invloed van zout- en ammoniagehalte op *Daphnia magna* (watervlo) en *Chironomus riparius* (muggelarve). RIZA-report 88/04 7 pp.
- Gulati RD, DeMott WR (1997) The role of food quality for zooplankton: remarks on the state-of the art, perspectives and priorities. *Freshwater Biol* 38:753–768
- Hallam TG, Lassiter RR, Li J, McKinney W (1990) Toxicant-induced mortality in models of *Daphnia* populations. *Environ Toxicol Chem* 9:597–621

- Haney JF, DJ Forsyth, MR James (1994) Inhibition of zooplankton filtering rates by dissolved inhibitors produced by naturally occurring cyanobacteria. *Arch Hydrobiol* 132:1–13
- Hansson LA, LJ Tranvik (1997) Algal species composition and phosphorus recycling at contrasting grazing pressure: an experimental study in sub-Antarctic lakes with two trophic levels. *Freshwater Biol* 37:45–54
- Harper DM, B Brierley, AJD Ferguson, G Phillips (eds) (1999) The ecological bases for lake and reservoir management. *Developments in Hydrobiology* 136. Kluwer Academic Publishers, Dordrecht
- Harrison KE (1990) The role of nutrition in maturation, reproduction and embryonic development of decapod crustaceans: a review. *J Shellfish Res* 9:1–28
- Hartgers EM, EHW Heugens, JW Deneer (1999) Effect of lindane on the clearance rate of *Daphnia magna*. *Arch Environ Contam Toxicol* 36(4):399–404
- Hatch AC, GA Burton (1999) Sediment toxicity and stormwater runoff in a contaminated receiving system: Consideration of different bioassays in the laboratory and field. *Chemosphere* 39(6):1001–1017
- Havens KE, T Hanazato (1993) Zooplankton community responses to chemical stressors: A comparison of results from acidification and pesticide contamination research. *Environ Pollut* 82:277–288
- Healy FP (1973) Characteristics of phosphorus deficiency in *Anabaena*. *J Phycol* 9:383–394
- Hecky RE, P Kilham (1988) Nutrient limitation of phytoplankton in freshwater and marine environments: a review of recent evidence on the effects of enrichment. *Limnol Oceanogr* 33:796–822
- Hecky RE, P Campbell, LL Hendzel (1993) The stoichiometry of carbon, nitrogen, and phosphorus in particulate matter of lakes and oceans. *Limnol Oceanogr* 38:709–724
- Hessen DO (1997) Stoichiometry in food webs: Lotka revisited. *Oikos* 79(1):195–200
- Hessen DO (1990) Carbon, nitrogen and phosphorus status in *Daphnia* at varying food conditions. *J Plankton Res* 12:1239–1249
- Hessen DO, E van Donk (1993) Morphological changes in *Scenedesmus* induced by substances released from *Daphnia*. *Arch Hydrobiol* 127:129–140
- Hillebrand H, U Sommer (1999) The nutrient stoichiometry of benthic microalgal growth: Redfield proportions are optimal. *Limnol Oceanogr* 44(2):440–446
- Hogenbirk M (1996) De algenproblematiek in het Amstelmeer. Een gebiedsgerichte Ecologische Risico Analyse. Report Department for Ecological Risk Studies DH96/22
- Holthaus KIE, HP van Dokkum, DPC van der Veen (2001) Blauwalgenbloei in de Geestmerambachtplas: een evaluatie van de monitoring en maatregelen in 2000. TNO report TNO-MEP R2001/138
- Hosper H (1997) Clearing lakes, an ecosystem approach to the restoration and management of shallow lakes in the Netherlands. Thesis Agricultural University Wageningen
- Hosper SH, ML Meijer, PA Walker (1992) Handleiding actief biologisch beheer. RIZA/OVB 102 pp.
- Hurlbert SH (1975) Secondary effects of pesticides on aquatic ecosystems. *Res Rev* 58:81–148
- Hurlbert SH, MS Mulla, HR Willson (1972) Effects of an organophosphorous insecticide on the phytoplankton, zooplankton, and insect populations of fresh-water ponds. *Ecol Monogr* 42:269–299
- Huwer SL, JM Brils (1999) The role and application of toxicity identification Evaluation (TIE) in the United States. TNO MEP R99/331
- Jak R.G. (1997): Toxicant-induced changes in zooplankton communities and consequences for phytoplankton development. Thesis, Free University of Amsterdam. ISBN 90-9010990-0. 125pp

- Jak RG, MCTh Scholten (1993) Mesocosm experimenten TNO Den Helder. Indicaties voor het ontstaan van eutrofiëringsverschijnselen. TNO report TNO-MEP R93/026
- Jak RG, JL Maas, MCTh Scholten (1996) Evaluation of laboratory derived toxic effect concentrations of a mixture of metals by testing fresh water plankton communities in enclosures. *Water Res* 30: 1215–1227
- Jak RG, JL Maas, MCTh Scholten (1998) Ecotoxicity of 3,4-dichloroaniline in enclosed freshwater plankton communities at different nutrient levels. *Ecotoxicology* 7:49–60
- Jeppesen E, M Sondergaard, JP Jensen, E Mortensen, O Sortkjaer (1996) Fish-induced changes in zooplankton grazing on phytoplankton and bacterioplankton: a long-term study in shallow hypertrophic Lake Sobygaard. *J Plankton Res* 18:1605–1625
- Jeppesen, E, Jensen, JP, Søndergaard, Lauridsen, M, Pedersen, B and Jensen LJ, (1997) Top-down control in freshwater lakes with special emphasis on the role of fish, submerged macrophytes and water depth. *Hydrobiologia* 342/343: 151–164
- Jørgensen SE (1986) Structural dynamic model. *Ecol Modell* 31:1–9
- Kasprzak P, RC Lathrop, SR Carpenter (1999) Influence of different sized *Daphnia* species on chlorophyll concentration and summer phytoplankton community structure in eutrophic Wisconsin lakes. *J Plankton Res* 21(11):2161–2174
- Kersting K, H van der Honing (1981) Effect of the herbicide dichlobenil on the feeding and filtering rate of *Daphnia magna*. *Verh Internat Verein Limnol* 21:1135–1140
- Kirk KL, JJ Gilbert (1990) Suspended clay and the population dynamics of planktonic rotifers and cladocerans. *Ecology* 71:1741–1755
- Klein G (1989) Anwendbarkeit des OECD-Vollenweider-Modells auf den Oligotrophierungsprozeß an eutrophierten Gewässern, *Vom Wasser* 73: 365–373 4394
- Knoechel R, B Holtby (1986) Construction and validation of a body-length-based model for the prediction of cladoceran community filtering rates. *Limnol Oceanogr* 31:1–16
- Lampert W, U Sommer (1997) *Limnoecology: the ecology of lakes and streams* Oxford University Press, Oxford
- Lampert W (1987a) Vertical migration of freshwater zooplankton: indirect effects of vertebrate predators on algal communities. In: WC Kerfoot, A Sih (eds), *Predation. Direct and indirect impact on aquatic communities*. University Press of New England, Hanover pp. 291–299
- Lampert W (1987b) Laboratory studies on zooplankton-cyanobacteria interactions. *NZ J Mar Freshwater Res* 21:483–490
- Lampert W (1987c) Feeding and nutrition in *Daphnia*. In: RH Peters, R De Bernardi (eds), *Daphnia*. *Mem Ist Ital Idrobiol* 45:143–192
- Lampert W (1988) The relationship between zooplankton biomass and grazing: A review. *Limnologica* 19:11–20
- Lampert W, W Fleckner, H Rai, BE Taylor (1986) Phytoplankton control by grazing zooplankton: a study on the spring clear-water phase. *Limnol Oceanogr* 31:478–490
- Lathrop RC, SR Carpenter, LG Rudstam (1996) Water clarity in lake Mendota since 1900: responses to differing levels of nutrients and herbivory. *Can J Fish Aquat Sci* 53:2250–2261
- Lauridsen TL, DM Lodge (1996) Avoidance by *Daphnia magna* of fish and macrophytes: chemical cues and predator-mediated use of macrophyte habitat. *Limnol Oceanogr* 41:794–798
- Lehman JT (1991) Interacting growth and loss rates: The balance of top-down and bottom-up controls in plankton communities. *Limnol Oceanogr* 36:1546–1554
- Leibold M, HM Wilbur (1992) Interactions between food-web structure and nutrients on pond organisms, *Nature* 360:341–343
- Likens GE (1972) Eutrophication and aquatic ecosystems. In: GE Likens (ed), *Nutrients and eutrophication: the limiting nutrient controversy*. *Limnol Oceanogr Special Symposia* 13–13

- Lürling M, E van Donk (1997) Life history consequences for *Daphnia pulex* feeding on nutrient limited phytoplankton. *Freshwater Biol* 38:693–710
- Lyche A, T Andersen, K Christoffersen, DO Hessen, PH Berger Hansen, A Klynsner (1996) Mesocosm tracer studies. I Zooplankton as sources and sinks in the pelagic phosphorus cycle of a mesotrophic lake. *Limnol Oceanogr* 41:460–474
- Lynch M (1980) The evolution of cladoceran life histories. *Quart Rev Biol* 55:23–42
- Mark U, J Solbé (1998) Analysis of the ECETOC Aquatic Toxicity (EAT) database. V-The relevance of *Daphnia magna* as a representative test species. *Chemosphere* 36:155–166
- Matveev V, L Matveeva (1997) Grazer control and nutrient limitation of phytoplankton biomass in two Australian reservoirs. *Freshwater Biol* 38:49–65
- Matveev V, W Gabriel (1994) Competitive exclusion in cladocera through elevated mortality of adults. *J Plankton Res* 16:1083–1094
- Matveev V, L Matveeva, GJ Jones (1994) Study of the ability of *Daphnia carinata* King to control phytoplankton and resist cyanobacterial toxicity: implications for biomanipulation in Australia. *Austr J Mar Freshwater Res* 45(5):889–904
- Mazumder A, DRS Lean (1994) Consumer-dependent responses of lake ecosystems to nutrient loading. *J Plankton Res* 16:1567–1580
- Mazumder A (1993) Phosphorus-chlorophyll relationships under contrasting zooplankton community structure: Potential mechanisms. *Can J Fish Aquat Sci* 51:401–407
- McCauley E, WW Murdoch, S Watson (1988) Simple models and variation in plankton densities among lakes. *Am Nat* 132:383–403
- McMahon JW, FH Rigler (1965) Feeding rate of *Daphnia magna* Straus in different foods labeled with radioactive phosphorus. *Limnol Oceanogr* 10:105–113
- McQueen DJ (1998) Freshwater food web biomanipulation: a powerful tool for water quality improvement, but maintenance is required. *Lakes Reserv Res Managem* 3:83–94
- Meador JP (1991) The interaction of pH, dissolved organic carbon, and total copper in the determination of ionic copper and toxicity. *Aquat Toxicol* 19:13–32
- Meijer ML (2000) Biomanipulation in the Netherlands, 15 years of experience. Thesis Agricultural University Wageningen
- Mjelde M, BA Faafeng (1997) *Ceratophyllum demersum* hampers phytoplankton development in some small Norwegian lakes over a wide range of phosphorus concentrations and geographical latitude. *Freshwater Biol* 37:355–365
- Moss B, H Balls (1989) Phytoplankton distribution in a floodplain lake and river system. II Seasonal changes in the phytoplankton communities and their control by hydrology and nutrient availability. *J Plankton Res* 11:839–867
- Moss B (1998) Shallow lakes biomanipulation and eutrophication. *Scope Newsletter* 29
- Moss B, J Madgwick, G Phillips (1996a) A guide to the restoration of nutrient-enriched shallow lakes Broads Authority, Norwich, UK
- Moss B, J Stansfield, K Irvine (1991) Development of daphnid communities in diatom- and cyanophyte-dominated lakes and their relevance to lake restoration by manipulation. *J Appl Ecol* 28:586–602
- Moss B, J Stansfield, K Irvine, M Perrows, G Phillips (1996b) Progressive restoration of a shallow lake: A 12-year experiment in isolation, sediment removal and biomanipulation. *J Appl Ecol* 33:71–86
- Moss B, S McGowan, L Carvalho (1994) Determination of phytoplankton crops by top-down and bottom-up mechanisms in a group of English lakes, the West Midland meres. *Limnol Oceanogr* 39:1020–1029
- Mount DR, DD Gulley, JR Hockett, TD Garrison, JM Evans (1997) Statistical models to predict the toxicity of major ions to *Ceriodaphnia dubia*, *Daphnia magna* and *Pimephales promelas* (Fathead minnows). *Environ Toxicol Chem* 16:2009–2019
- Muñoz MJ, C Ramos, JV Tarazona (1996) Bioaccumulation and toxicity of hexachlorobenzene in *Chlorella vulgaris* and *Daphnia magna*. *Aquat Toxicol* 35:211–220
- Odum EP (1985) Trends expected in stressed ecosystems. *BioScience* 35:419–422

- OECD (1982) Eutrophication of waters. Monitoring, assessment and control. OECD, Paris
- OECD (1993a) OECD guidelines for the testing of chemicals. Organisation for Economic Co-operation and Development, Paris 2 vol.
- OECD (1993b) Guideline for testing of chemicals no 201: "Algal Growth inhibition test" adopted 7 June 1984, Organisation for economic Co-operation and Development, Paris (1993)
- Ogilvie BG, SF Mitchell (1998) Does sediment resuspension have persistent effects on phytoplankton? Experimental studies in three shallow lakes. *Freshwater Biol* 40:51–64
- Ordelman HGK, PBM Stortelder, TEM ten Hulscher, FH Wagemaker, JM van Steenwijk, J Botterweg, PCM Frintrop, HG Evers (1993a) Watersysteemverkenningen. Carbamaten. RIZA report 93.010 / DGW report 93.022
- Ordelman HGK, PCM van Noort, JM van Steenwijk, TEM ten Hulscher, HG Evers (1993c) Watersysteemverkenningen. Triazinen. RWS RIZA report 93.036/ DGW RIKZ report 93.050 182 pp.
- Ordelman HGK, PCM van Noort, JM van Steenwijk, TEM ten Hulscher, MA Beek, J Botterweg, R Faasen, PCM Frintrop, HG Evers (1993b) Watersysteemverkenningen. Dithiocarbamaten. RWS RIZA report 93.025/ DGW report 93.041 154 pp.
- Ordelman HGK, PCM van Noort, TEM ten Hulscher, MA Beek, JM van Steenwijk, PCM Frintrop, EHG Evers (1994) Watersysteemverkenningen. Organofosforbestrijdingsmiddelen. RWS RIZA nota 94.043/ DGW report RIKZ-94.028 186 pp. Plus annexes
- Ostroumov AP (2002) Inhibitory analysis of top-down control: new keys to studying eutrophication, algal blooms, and self-purification. *Hydrobiologia* 496:117–129
- Overbeck J (1989) Qualitative and quantitative assessment of the problem. In: SE Jørgensen, RA Vollenweider (eds), *Guidelines of lake management. Vol 1 Principles of lake management*. UNEP International Lake Environment Committee pp. 43–52
- Parsons T (1982) The future of controlled ecosystem enclosure experiments. In: GD Grice, MR Reeve (eds), *Marine mesocosms. Biological and chemical research in experimental ecosystems*. Springer-Verlag, New York pp. 411–418
- Pastor J, D Binkley (1998) Nitrogen fixation and the mass balances of carbon and nitrogen in ecosystems. *Biogeochemistry* 43(1):63–78
- Persoone G, CR Janssen (1993) Freshwater invertebrate toxicity tests. In: P Calow (ed), *Handbook of ecotoxicology. Vol. 1* Blackwell Scientific Publications, Oxford pp. 51–65
- Portielje R, DT van der Molen (1997a) Trendanalyse eutrofiëringstoestand van de Nederlandse meren en plassen. Deelrapport I voor de Vierde Eutrofiëringsevenquete RWS RIZA report 97.060
- Portielje R, DT van der Molen (1997b) Relaties tussen eutrofiëringvariabelen en systeemkenmerken van de Nederlandse meren en plassen, RIZA report 98.007
- Portielje R, DT van der Molen (1998) Trend-analysis of eutrophication variables in lakes in The Netherlands. *Water Sci Technol* 37(3):235–240
- Pott E (1980) Die Hemmung der Futteraufnahme von *Daphnia pulex* – eine neue limnotoxikologische Messgröße. *Z Wasser Abwasser Forsch* 13(2):52–54
- Reading JT, AL Buikema (1980) Effects of sublethal concentrations of Selenium on metabolism and filtering rate of *Daphnia pulex*. *Bull Environ Contam Toxicol* 24:929–935
- Reckendorfer W, Keckeis H, Winkler G, Schiemer F (1999) Zooplankton abundance in the River Danube, Austria: the significance of inshore retention. *Freshwater Biol* 41(3):583–591
- Repka S (1996) Inter- and intraspecific differences in *Daphnia* life histories in response to two food sources: the green alga *Scenedesmus* and filamentous cyanobacterium *Oscillatoria*. *J Plankton Res* 18:1213–1223



- Repka S (1997) Effects of food type on the life history of *Daphnia* clones from lakes differing in trophic state. I *Daphnia galatea* feeding on *Scenedesmus* and *Oscillatoria*. *Freshwater Biol* 38:675–683
- Reynolds CS (1989) Physical determinants of phytoplankton succession. In: U Sommer (ed), *Plankton ecology*. Springer-Verlag, Berlin pp. 9–56
- Reynolds CS (1992) Eutrophication and the management of planktonic algae: What Volenweider couldn't tell us. In: DW Sutcliffe, JG Jones (eds), *Eutrophication: Research and application to water supply*. Freshwater Biological Association Special Publication, Ambleside pp. 4–29
- Reynolds CS (1994) The ecological basis for the successful biomanipulation of aquatic communities. *Arch Hydrobiol* 130:1–33
- RIVM (1995) Achtergronden bij: Milieubalans 95. Samsom HD Tjeenk Willink, Alphen aan den Rijn
- Rohrback T, M Henning, JG Kohl (1999) Mechanisms of the inhibitory effect of the cyanobacterium *Microcystis aeruginosa* on *Daphnia galeata*'s ingestion rate. *J Plankton Res* 21(8):1489–1500
- Romanovsky YE (1984) Individual growth rate as a measure of competitive advantages in cladoceran crustaceans. *Int Rev Ges Hydrobiol* 69:613–632
- Romanovsky YE (1985) Food limitation and life-history strategies in cladoceran crustaceans. *Arch Hydrobiol Beih Ergebn Limnol* 21:363–372
- Rothaupt KO (1997) Grazing and nutrient influences of *Daphnia* and *Eudiaptomus* on phytoplankton in laboratory microcosms. *J Plankton Res* 19:125–139
- Salmaso N, F Decet, P Cordella (1999) Understanding deep oligotrophic subalpine lakes for efficient management. *Hydrobiologia* 396:253–263
- Sarnelle O (1992) Nutrient enrichment and grazer effects on phytoplankton in lakes. *Ecology* 73:551–560
- Scheffer M (1998) *Ecology of shallow lakes*. Population and Community Biology Series 22. Chapman, Hall, London
- Scheffer M, SH Hopper, M-L Meijer, B Moss, E Jeppesen (1993) Alternative equilibria in shallow lakes. *TREE* 8:275–279
- Schreurs H (1992) Cyanobacterial dominance. Relations to eutrophication and lake morphology. Thesis University of Amsterdam
- Sharpley AN, S Rekolainen (1997): Phosphorus in agriculture and its environmental implications. In: H Tunney, OT Carton, PC Brookes, AE Johnston (eds), *Phosphorus loss from soil to water*. CAB International, New York pp. 1–53
- Sharpley AN, MJ Hedley, E Sibbesen, A Hillbricht-Ilkowska, WA House, L Ryszkowski (1995) Phosphorus transfers from terrestrial to aquatic ecosystems. In: H Tiessen (ed), *Phosphorus in the global environment*. Scope 54, John Wiley, Sons, Chichester pp. 177–199
- Sommer U (1989) The role of competition for resources in phytoplankton succession. In: U Sommer (ed), *Plankton ecology*. Springer-Verlag, Berlin pp. 57–106
- Sommer U (1992) Phosphorus-limited *Daphnia*: intraspecific facilitation instead of competition. *Limnol Oceanogr* 37:966–973
- Sommer U, ZM Gliwicz, W Lampert, A Duncan (1986) The PEG-model of seasonal succession of planktonic events in fresh waters. *Arch Hydrobiol* 106:433–471
- Spencer CN, BK Ellis (1998) Role of nutrients and zooplankton in regulation of phytoplankton in Flathead Lake (Montana, USA), a large oligotrophic lake. *Freshwater Biol* 39:755–764
- Stansfield J, B Moss, K Irvine (1989) The loss of submerged plants with eutrophication. III Potential role of organochlorine pesticides: a paleoecological study. *Freshwater Biol* 22:109–132

- Stephen D, B Moss, G Phillips (1998) The relative importance of top-down and bottom-up control of phytoplankton in a shallow macrophyte-dominated lake. *Freshwater Biol* 39:699–714
- Sterner RW (1993) Daphnia growth on varying quality of Scenedesmus: Mineral limitation of zooplankton. *Ecology* 74:2351–2360
- Streble H, D Krauter (1988) *Leben im Wassertropfen. Mikroflora und Mikrofauna des Süßwassers*. Franckh-Kosmos Verlags, Stuttgart
- Stumm W, JJ Morgan (1996) *Aquatic chemistry. Chemical equilibria and rates in natural waters*. John Wiley, Sons, New York 3rd ed
- Suedel BC, E Deaver, JH Rodgers (1996) Formulated sediment as a reference and dilution sediment in definitive toxicity tests. *Arch Environ Contam Toxicol* 30:47–52
- Taylor G, DJ Baird, AMVM Soares (1998) Surface binding of contaminants by algae: consequences for lethal toxicity and feeding to Daphnia magna Straus. *Environ Toxicol Chem* 17:412–419
- Teunissen-Ordelman HGK, SM Schrap (1996b) Watersysteemverkenningen. Bestrijdingsmiddelen. RWS RIZA report 96.040
- Teunissen-Ordelman HGK, PCM van Noort, JM van Steenwijk, MA Beek, THEM ten Hulscher, PCM Frintrop, R Faasen (1995b) Watersysteemverkenningen. Bentazon en chloridazon. RWS RIZA report 95.046
- Teunissen-Ordelman HGK, PCM van Noort, MA Beek, TEM ten Hulscher, JM van Steenwijk, R Faasen, PCM Frintrop (1995a) Watersysteemverkenningen. Chloorfenoxycarbozuren. RWS RIZA report 95.007
- Teunissen-Ordelman HGK, PCM van Noort, SM Schrap, MA Beek, JM van Steenwijk, R Faasen, PCM Frintrop (1995c) Watersysteemverkenningen. Nitroanilinen. RWS RIZA draft report
- Teunissen-Ordelman HGK, SM Schrap, PCM van Noort, JM van Steenwijk, MA Beek, R Faasen, PCM Frintrop (1996c) Watersysteemverkenningen. Aniliden. RWS RIZA report 97.021
- Teunissen-Ordelman HGK, SM Schrap, PCM van Noort, MA Beek, R Faasen, JM van Steenwijk, PCM Frintrop (1996a) Watersysteemverkenningen. Pyrethroiden. RWS RIZA draft report
- Thompson JM, AJD Ferguson, CS Reynolds (1982) Natural filtration rates of zooplankton in a closed system: The derivation of a community grazing index. *J Plankton Res* 4:545–560
- Tilman D, SS Kilham, P Kilham (1982) Phytoplankton community ecology: The role of limiting nutrients. *Ann Rev Ecol Syst* 13:349–372
- Timms RM, B Moss (1984) Prevention of growth of potentially dense phytoplankton populations by zooplankton grazing, in the presence of zooplanktivorous fish, in a shallow wetland ecosystem. *Limnol Oceanogr* 29:472–486
- Torres-Orozco R E, SA Zanatta (1998) Species composition, abundance and distribution of zooplankton in a tropical eutrophic lake: Lake Catemaco, México. *Tropical Biol* 46(2)
- Urabe J, M Nakanishi, K Kawabata (1995) Contribution of metazoan plankton to the cycling of nitrogen and phosphorus in Lake Biwa. *Limnol Oceanogr* 40:232–241
- Valiela I (1993) Ecology of water columns. In: RSK Barnes, KH Mann (eds), *Fundamentals of aquatic ecology*. Blackwell Scientific Publications, Oxford 2nd ed pp. 29–56
- Van der Gun JHJ, J Joziassé (1999) In-situ waterbodemsanering: voorstelbaar en haalbaar? Rapporten Programma Geïntegreerd Bodemonderzoek deel 23, ISBN 90-73270-38-3
- Van der Helm R (2000) Rapportage signalerend onderzoek bestrijdingsmiddelen in hoofdwatersysteem Hollands Noorderkwartier, 1998. Hoogheemraadschap van Uutwaterende Sluizen in Hollands Noorderkwartier
- Van Dokkum HP, G Hoornsman (2000) Monitoring blauwalgen in de Geestmerambachtplas in de zomer van 1999. TNO report TNO-MEP -R 2000/007

- Van Dokkum HP, G Hoornsman, DPC van der Veen (1999) Blauwalgenbloei in de Geestmerambachtplas in de zomer van 1998. TNO rapport TNO report TNO-MEP – R99/047
- Van Donk E, DO Hessen (1993) Grazing resistance in nutrient-stressed phytoplankton. *Oecologia* 93:508–511
- Van Donk E, M Lürling, DO Hessen, GM Lokhorst (1997) Altered cell wall morphology in nutrient-deficient phytoplankton and its impact on grazers. *Limnol Oceanogr* 42:357–364
- Van Luijn F, DT van der Molen, WJ Luttmer, PCM Boers (1995) Influence of benthic diatoms on the nutrient release from sediments of shallow lakes recovering from eutrophication. *Water Sci Technol* 32:89–97
- Van Steenwijk JM, GAJ Mol (1996) Toetsing huidige en verwachte water(bodem)kwaliteit aan de grenswaarden. RWS RIZA notanr 95.063
- Vanni MJ, CD Layne (1997) Nutrient recycling and herbivory as mechanisms in the "top-down" effect of fish on algae in lakes. *Ecology* 78:21–40
- Vanni MJ, C Luecke, JF Kitchell, JJ Magnuson (1990) Effects of planktivorous fish mass mortality on the plankton community of Lake Mendota, Wisconsin: implications for biomanipulation. *Hydrobiologia* 200/201:329–336
- Vijverberg, J, Gulati, RD, Mooij, WM, (1993) Food-web studies in shallow eutrophic lakes by the Netherlands institute of ecology: main results, knowledge gaps and new perspectives, 27(1): 35–49 4128
- Vitousek PM, JD Aber, RW Howarth, GE Likens, PA Matson, DW Schindler, WH Schlesinger, DG Tilman (1997) Human alteration of the global nitrogen cycle: sources and consequences. *Ecol Appl* 7:737–750
- Vollenweider RA, J Kerekes (1980) The loading concept as basis for controlling eutrophication philosophy and preliminary results of the OECD programme on eutrophication. *Prog Water Technol* 12:5–38
- Vollenweider RA (1990) Eutrophication: Conventional and non-conventional considerations and comments on selected topics. In: R de Bernardi, G Giussani, L Barbanti (eds), *Scientific perspectives in theoretical and applied limnology*. *Mem Ist Ital Idrobiol* 47:77–134
- Von Sperling E (1997) The process of biomass formation as the key point in the restoration of tropical eutrophic lakes. *Hydrobiologia* 342/343:351–354
- Wang W (1987) Factors affecting metal toxicity to (and accumulation by) aquatic organisms – overview. *Environ Int* 13:437–457
- Wetzel RG (1990) Detritus, macrophytes and nutrient cycling in lakes in Scientific perspectives in theoretical and applied limnology. In De Bernadi R, G Giussani and L Barbanti (eds). *Mem Ist Ital Idrobiol*, 47:233–249
- Winner RW, HA Owen, MV Moore (1990) Seasonal variability in the sensitivity of freshwater lentic communities to a chronic copper stress. *Aquat Toxicol* 17:75–92
- WL (1996) Bestrijding van eutrofiëring in de Geestmerambachtplas. WL rapport T1245
- Yasuno M, A Asaka, Y Kono (1993) Effects of pyraclofos (an organophosphorous insecticide) on nutrient enriched ecosystems. *Chemosphere* 27:1813–1824
- Zaffagnini F (1987) Reproduction in *Daphnia*. In: RH Peters, R De Bernardi (eds), *Daphnia*. *Mem Ist Ital Idrobiol* 45:245–284
- Zurek R, H Bucka (1994) Algal size classes and phytoplankton-zooplankton interacting effects. *J Plankton Res* 16:583–601