

# Nitrogen Deposition, Critical Loads and Biodiversity

The George Hotel, Edinburgh, Scotland, UK – 16-18 November, 2009



## BIOSKETCHES OF CHAIRS AND SPEAKERS



**Wenche Aas** is a Senior Scientist at NILU, the Norwegian Institute for Air Research at the Dept. Atmospheric and Climate research. Ms Aas has a PhD in Chemistry and works with topics concerning acidification, eutrophication, heavy metal and particulate matter where the main experience is concerning quality control. She is responsible for the Norwegian monitoring network of atmospheric deposition, on behalf of the Norwegian Pollution Control Agency (SFT); Ms Aas is project leader for the EMEP measurements of heavy metals as well as reporting to HELCOM and AMAP. She is responsible for upgrading the EMEP manual for sampling and chemical analysis. An important task concerns training and capacity building in the EECCA countries. Wenche Aas is member of the Scientific Advisory Group for Precipitation Chemistry in WMO/GAW. Ms Aas is convenor for the CEN working group on deposition of heavy metals.

**Julian Aherne** holds a Canada Research Chair in Environmental Modeling at Trent University, Canada. His research concentrates on the impacts of anthropogenic disturbance (air pollution, land use management and climate change) on terrestrial and aquatic ecosystems. He is a collaborator with the Canadian and Irish National Focal Centres (ICP Modelling and Mapping) under the UNECE Convention on Long-Range Transboundary Air pollution. He has an avid interest in time management and tiddlywinks. His address: Environmental and Resource Studies, Trent University, 1600 West Bank Drive, Peterborough, Ontario K9J 7B8, Canada. E-mail: [julian.aherne@ucd.ie](mailto:julian.aherne@ucd.ie)



**Jill S. Baron** is an ecosystem ecologist with the U.S. Geological Survey, and a Senior Research Ecologist with the Natural Resource Ecology Laboratory at Colorado State University ([jill@nrel.colostate.edu](mailto:jill@nrel.colostate.edu)). Her interests include applying ecosystem concepts to management of human-dominated regions, and understanding the biogeochemical and ecological effects of climate change and atmospheric nitrogen deposition to mountain ecosystems. Recently Baron served as Lead Author of the US Climate Change Science Program report on Climate Change Adaptation Options for National Parks, and was a member of the Department of Interior Climate Change Task Force and the USGS Science Strategy Team. She is co-director of the new John Wesley Powell Center for Earth System Science Analysis and Synthesis.

**Salim Belyazid** holds a PhD in chemical engineering with focus on dynamic biogeochemical modelling. He currently works on integrating the effects of multiple drivers on terrestrial ecosystems. Integrating multiple drivers simultaneously is imperative to simulating the link from N deposition to effects on biological endpoints. Climate change and land use in particular are central in steering the response of ecosystem biogeochemistry and biology to N inputs and N loads. Salim is also investigating the use of plant community composition as a direct biological indicator of ecosystem reaction to N deposition in order to estimate critical loads of N deposition using dynamic modelling in terrestrial ecosystems.





**Haldis Berge** is a researcher at the Norwegian Meteorological Institute in the department of research and development, air pollution section. She obtained the degree Master of Science from the University of Oslo in 2009. Her interests include atmospheric modeling in particular nitrogen chemistry and the formation of nitrate. She recently started to work for the Meteorological Synthesizing Centre West (MSC-W) within the EMEP programme. She has developed a new parameterization of coarse nitrate in the Unified EMEP model and will continue working in this field within a new ammonia project funded by the Nordic Council of Ministers.

**Theresa Bird** - I am interested by ecosystem sustainability under global change. At present I am working towards my PhD in the School of Animal, Plant and Environmental Sciences at the University of the Witwatersrand, Johannesburg. This research project aims to quantify the impacts of nitrogen and sulphur deposition on the soils and waters of the economically important Vaal Dam catchment in the interior of South Africa. The catchment falls within the most impacted region of South Africa where industry and power generation coincide with large urban populations. In addition to the research I also teach ecology, sustainability and global change themes at an undergraduate and postgraduate level.



**Tamara Franklin Blett** is an ecologist with the Air Resources Division of the U.S. National Park Service, and coordinates the interaction between science and policy related to air pollution impacts for National Parks across the US. She collaborates with researchers around the U.S. to initiate projects expanding the science of critical loads and ecosystem thresholds. She currently serves as co-chair of the Critical Loads Subcommittee (CLAD) under the U.S. National Atmospheric Deposition Program; the group's function is to coordinate and communicate critical loads science and application between multiple state and federal agencies, university researchers and other interested stakeholders.

**Roland Bobbink** is director/senior scientist at B-WARE Research Centre BV, Radboud University, Nijmegen, The Netherlands. His main research topic are the ecological consequences of environmental stresses, especially of atmospheric N inputs, on the structure and functioning of (semi-)natural ecosystems. Since the early 1990s he also worked on the development of the empirical approach for N critical loads in Europe. In the last 15 yrs, ecological restoration of degraded nature reserves became his second major research aim. He did research in species-rich grasslands, dry and wet heaths, fens and related wetlands and shallow softwater lakes. He is (co)author of around 100 peer-reviewed scientific papers, 3 books and around 80 publications in Dutch. He is member of the national committee on ecological restoration in the Netherlands and chairman of the Netherlands-Flanders Ecological Society.





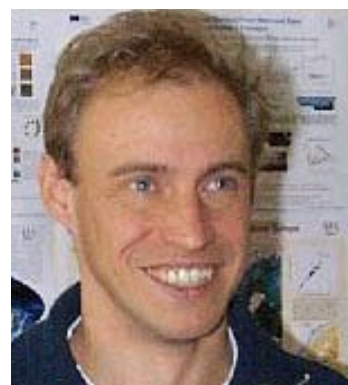
**Tom Clair** is a Research Scientist in Environment Canada's Water Science and Technology Division and is responsible for managing studies on the effects of air pollutants on freshwaters and wetlands. Over the course of his career, he has published work on acid rain, carbon and nitrogen cycling, mercury contamination and the effects of ultraviolet radiation on ecosystems. He is currently the Government of Canada's representative on the UNECE Working Group on Effects and the Task Force on Reactive Nitrogen. He is also coordinating a Canadian multidepartmental work group assembling information on reactive nitrogen emissions, atmospheric transport and transformation and ecological and health effects for use by science managers and policy experts

**Sarah Cornell** works on integrative socio-environmental research at the University of Bristol, where she directs a Masters programme in Earth System Science and is currently engaged in multi-faculty research development on the human dimensions of global change. She is also the science programme manager for the UK NERC-funded programme QUEST (Quantifying and Understanding the Earth System, 2004-2010). Her research background is in biogeochemistry, with a continuing interest in the perturbed global nitrogen cycle, and in environmental resource management. In recent years, she has become more engaged in use-oriented transdisciplinary research, with a particular focus on conceptualisations of humans in the Earth system.



**Robin L. Dennis** received his PhD in physics at the University of Wisconsin-Madison and then switched to study air quality in a multi-disciplinary framework. A key interest is bringing science to bear to inform and guide decision making. He was involved in setting the vision for EPA's third generation air quality modeling system and the resulting Community Multi-scale Air Quality Model (CMAQ). He has been engaged in the diagnostic evaluation of regional models. He has applied regional atmospheric models for assessments, with an emphasis on linking cross-media models, particularly linking air and water for coastal estuarine assessments, (e.g., for Chesapeake Bay) with attention to atmospheric deposition. More recently he has been engaged in linking air and fresh water/terrestrial ecosystem models for critical loads assessments. Dr. Dennis is the AMAD theme lead for ecosystem exposure modeling.

**Frank Dentener** works since 20 years in the field of atmospheric sciences. He completed a M.Sc. in chemical engineering, and a Ph.D. in Physics and Astrophysics with Nobel prize-laureate Paul Crutzen at Utrecht University, the Netherlands. He is a member of the IUPAC Commission Atmospheric Chemistry and Global Pollution and has served as lead and contributing author on 3 IPCC reports. He has (co-)authored in more than 100 peer-reviewed publications, and he is associate editor of the journal Atmospheric Chemistry and Physics since 2002. Having served as group leader and acting head of unit in the JRC Climate Change Unit, he is now in charge of the modeling division of the CCU. He is an expert in large scale modelling of atmospheric chemistry and aerosol formation processes, interactions between atmospheric gasses and aerosol, the atmospheric nitrogen cycle and their representation in global atmospheric models. Model results are used to design optimized policy strategies to reduce both the emissions of climate gases and air pollution





**Enzai Du** - PhD. Student, Department of Ecology, College of Urban and Environmental Sciences, Peking University, Beijing, China, 100871

Research Interests:

Impacts of nitrogen deposition on carbon sequestration of forest ecosystems across China

Impacts of nitrogen deposition on biodiversity in forest ecosystems of China

Evaluation of the magnitude of nitrogen emissions and deposition in China

Policy issues of reactive nitrogen regulation in China

Presentation Outline - Research Progress of Nitrogen Deposition in China

The magnitude of NH<sub>3</sub> and NO<sub>x</sub> Emissions in China

Patterns and trends of Nitrogen deposition in China

Ecological impacts of Nitrogen Deposition in Forest Ecosystems in China

Research Gaps and Plans of our Group

**Lei Duan**, associate professor and vice-head of the department, is an environmental scientist with current interest and strong experience in critical load mapping in China, and monitoring and modeling effects of environmental changes on soil, surface water, and terrestrial ecosystem. He has been involved in both national and international collaborations as the principle investigator or project leader. He runs several monitoring sites in China to test the effects of liming and nitrogen on forest ecosystem. In addition, he has broad experience in supporting policy-making on effect-based air pollution control.



**Jan Willem Erisman** has a background in environmental research, especially the atmosphere – biosphere exchange of gases and aerosols related to acidification and eutrophication and climate change, both scientific as well as policy development and evaluation studies. Recently work has focused on optimizing food production and energy use while minimizing the environmental impacts from increased nitrogen cycling. During three years he was unit manager Clean Fossil Fuels, managing research on hydrogen production from fossil fuels, hydrogen storage and concepts for a hydrogen economy, CO<sub>2</sub> capture technologies, environmental emission reduction technologies and environmental research. Since 2006 he heads the unit Biomass, Coal and Environmental research, managing about 70 scientists working in the field of environmental research, research on biomass pre-treatment and conversion

technologies, liquid and gaseous products from biomass and environmental reduction technologies. He is extraordinary professor at the VU university Amsterdam on Integrated nitrogen studies.

**Alan Feest** - Water and Environmental Management Research Centre, Department of Civil Engineering, University of Bristol, Bristol BS8 1TR, UK  
Present Appointments:

2007 – Senior Lecturer, Department of Civil Engineering, University of Bristol

2007- Non-executive Director, ecosulis Ltd., Newton St. Loe, Bath

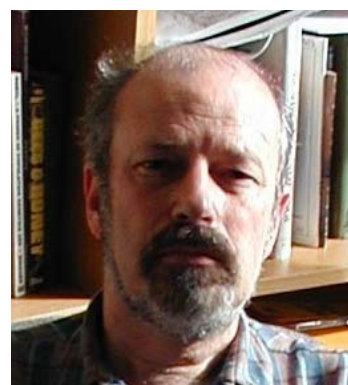
Relevant International Reports:

Bareham, S.A., Sutton, M.A., van Hinsberg, A., Dirnbock, T., Hens, M., Sponar, M., Blagodatsky, S., Feest, A., Horlyck, V., Bleeker, A., Teller, A. and Delbaere, B. (2006) Selection of a European Indicator for Nitrogen Deposition. SEBI2010: Streamlining European 2010 Biodiversity Indicators Expert Group 4: Nitrogen Deposition. For the European Environment Agency.

Feest, A., Van Swaay, C. and van Hinsberg, A. (2008) Research to test the Integration of the Nitrogen Critical Load Exceedence Model (EG4) into the 2010 target by linking it to the Butterfly Indicator (EG1)

Academic Journal Papers Refereed: 30

Current research activity - Whilst I have worked extensively on soil ecology my current interests are focussed on the measurement of biodiversity especially as a feature of nitrogen deposition.



**James N. Galloway** is the Sidman P. Poole Professor of Environmental Sciences, and the Associate Dean of Science in the College of Arts and Sciences, at the University of Virginia. Dr. Galloway received the B.A. degree in Chemistry and Biology from Whittier College in 1966. In 1972 he received his Ph.D. degree in Chemistry from the University of California, San Diego. Following two years as a professional potter in Lexington, Virginia, he accepted a postdoctoral appointment with Gene Likens at Cornell University. In 1976, he accepted a position as Assistant Professor of Environmental Sciences at the University of Virginia. He served as President of the Bermuda Biological Station for Research (now Bermuda Institute of Ocean Sciences) from 1988 to 1995, and as chair of Environmental Sciences, University of Virginia from 1996 to 2001. He served as the founding chair of the International Nitrogen Initiative from 2003 to 2008, and was a member of the USA EPA Science Advisory Board from 2003 to 2009. In 2002 he was elected a Fellow of the American Association for the Advancement of Science. In 2008 he was elected a Fellow of the American Geophysical Union and was awarded, with Harold Mooney, the Tyler Prize for Environmental Achievement. His research on biogeochemistry includes the natural and anthropogenic controls on chemical cycles at the watershed, regional and global scales. His current research focuses on beneficial and detrimental effects of reactive nitrogen as it cascades between the atmosphere, terrestrial ecosystems and freshwater and marine ecosystems.



**Christine Goodale** is a forest ecosystem ecologist, with primary research interests in understanding the effects of human activities such as anthropogenic nitrogen deposition, land-use change, and climate change, on forest carbon and nitrogen balance, catchment biogeochemistry, and feedbacks to the climate system. She is presently an Assistant Professor in the Department of Ecology and Evolutionary Biology at Cornell University. She received an M.S. and Ph.D. in natural resources from the University of New Hampshire, and served as a postdoctoral fellow at the Carnegie Institution of Washington at Stanford, California, and the Woods Hole Research Center, Massachusetts. She has served on regional, national, and international working group assessing human alteration of the carbon and nitrogen cycles, including the Hubbard Brook Research Foundation, the U.S.

EPA's Ecological Effects Subcommittee of the Advisory Council on Clean Air Compliance, the SCOPE project on nitrogen transport and transformations, and the North American Carbon Program.

**Tara Greaver** received her M.S. and Ph.D. in ecology from the University of Miami, where she investigated the effects of sea-level rise on coastal plant communities in the Caribbean. After a post doctoral fellowship in the department of Earth and Planetary Sciences at Johns Hopkins University, Dr. Greaver joined the U.S. Environmental Protection Agency's National Center for Environmental Assessment. She is currently the project manager for the Integrated Science Assessment (ISA) for Oxides of Nitrogen and Sulfur- Ecological Criteria. The ISA includes assessment of the effects of nitrogen and sulfur deposition on ecosystems in the U.S. and serves as the scientific foundation for the review of the NO<sub>x</sub> and SO<sub>x</sub> secondary National Ambient Air Quality Standards. Her current research evaluates the ecological effects of nitrogen deposition, with a special interest in ecosystem services and interactions with climate change factors.



**Rick Haeuber** is Chief of the Assessment and Communications Branch within the Clean Air Markets Division of the U.S. Environmental Protection Agency. Before becoming Branch Chief in August 2006, he served as a senior policy analyst, focusing on the ecological effects of air pollution on terrestrial, aquatic, and coastal ecosystems. From January to December 2004, Rick served as a Congressional Fellow in the office of Senator Tom Carper (D-DE), advising the Senator and his policy staff on air quality issues and multi-pollutant control legislation. Prior to joining the EPA in June 1999, Rick served as Associate Director of the Science Program Office of the Ecological Society of America focused on improving science-policy interactions. Rick holds an M.A. and Ph.D. in International Studies from the University of South Carolina. He has published on a wide variety of topics, including the politics and

economics of development and environment, forestry in India, environmental assessment and monitoring, air quality and environmental impacts, and the application of ecological principles to land use and natural resources management.

**Jean-Paul Hettelingh** directs the Coordination Centre for Effects (CCE). The CCE runs a European network of about 30 National Focal Centres. The CCE and its network are of key importance to the assessment of ecosystem effects of European air pollution abatement policies since 1990 (see [www.pbl.nl/cce](http://www.pbl.nl/cce)). The academic background of Jean-Paul is Econometrician and he holds a Ph.D in economics. He held research positions at the Free University (Amsterdam), at the International Institute of Applied Systems Analysis (IIASA-Austria), and a professorship at the University of Leiden. He has Extensive experience with the modelling of Environmental systems in general and of effects of air pollution in particular. He is co-author of environmental impact modules of integrated assessment models of air pollution in Europe (RAINS) and Asia (RAINS-Asia). He conducted the development and policy application of methodologies for the computation and use of critical thresholds for air pollution on broad spatial and temporal scales.



**Kevin Hicks** is a Research Fellow at the Stockholm Environment Institute (SEI), University of York, UK. His research interests focus on the transfer of scientific information to the policy process. Areas of interest include air pollution impacts on terrestrial ecosystems from local to global scales, ecosystem service approaches to environmental management, the potential for integrated policies on air pollution and climate change, and air pollution issues in developing countries. He has organized international workshops on nitrogen deposition impacts to ecosystems and participated in UN/ECE scientific and other national/international meetings on air pollution issues, as well as currently being involved in the European Nitrogen Assessment. He has also worked on projects for the UK government and conservation agencies related to nitrogen impacts on terrestrial ecosystems and the development of the ecosystem service approach. He is a co-founder of the Global Atmospheric Pollution Forum and co-ordinates the Secretariat ([www.gapforum.org](http://www.gapforum.org)).

**Larisa Khanina** works in simulation modeling and knowledge engineering for ecology. She graduated from Moscow Institute of Management, Department of Computer Science for Economy. After postgraduate studies in Database and Information Technologies at the same institute, she has been working in Pushchino Biological Center of Russian Academy of Sciences (RAS). In 1997 she received her PhD 'Information-analytical system for forest biodiversity assessment' from Institute of Forest Science of RAS. Now Larisa Khanina is the Head of Laboratory of Computational Ecology in Institute of Mathematical Problems in Biology of RAS and a part-time Associated Professor in Educational Center of Soil Science, Ecology, and Natural Resources in Pushchino State University. Her research interests include forest ecology, soil-vegetation analysis, simulation modeling of forest vegetation, plant functional groups, dynamics of vegetation after disturbances and under the global changes, modeling of ground vegetation in forest ecosystem cycle models.





**Umesh Kulshrestha** - I have been involved in aerosols and atmospheric deposition studies in Indian region for last two decades. I have been associated with several programmes such as CAAP, CAD of RAPIDC, INDOEX, ABC, ICARB, LCII etc. I am doctorate from Dayalbagh Educational Institute, Agra (India). Then I joined NPL, New Delhi as Research Associate. I had opportunity to work with Prof H. Rodhe at Department of Meteorology, Stockholm University, Sweden. After struggling as post doc, I got job as scientist in CSIR lab called Indian Institute of Chemical Technology at Hyderabad. There, I developed an aerosol and precipitation research group along with all the basic facilities. Our group has been very active in CAD programme. In collaboration with IMI and SMHI Sweden, we have consolidated and mapped the hot spots of high deposition of S and N and spots of high sensitivity to acidification in India. The cause of alkalinity of rain water in India has also been established by our group. I have been south Asian coordinator for QA/QC in aerosol chemistry measurements in ABC project of Stockholm University. Recently, I have moved as Professor at School of Environmental Sciences, Jawaharlal Nehru University, New Delhi where I have started research on atmospheric depositions and climate change.

**Xiankai Lu** - Assistant Professor of South China Botanical Garden, Chinese Academy of Sciences. Ph. D., South China Botanical Garden, Chinese Academy of Sciences, China

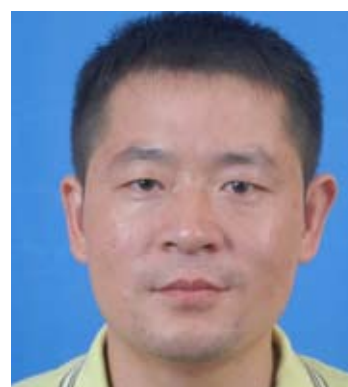
Speciality: Global change ecology /Biogeochemistry.

Research Interests:

Effects of N deposition on plant diversity and productivity in forests with different succession stages. Through this study, I want to test the following hypothesis: In the early succession stage, plant growth is N-limited; in the middle succession stage, plant growth becomes light limited; in the final succession stage, plant growth is neither N-limited or light limited.

N/P stoichiometry characteristics in tropical forests under N deposition. With the development of forest succession stage, ecosystem will become limited by phosphorus, by reflecting high N/P ratios in leaf and soil, and N deposition will accelerate this limitation by showing the slow or declining growth trends of plants and accelerating carbon accumulation.

Soil buffering capacity, and soil and plant element chemistry in tropical forests. In highly weathered tropical forests, high N input will at last decrease soil buffering capacity, and nutrient cation (e.g. Ca, Mg) will become key limited factors in these forests.



**Colin McClean** has over 20 years of experience in the application of GIS to the study of spatial processes in the environment across a range of scales. All such work has attempted to overcome the associated data uncertainty problems. Work at York has mainly been in the application of spatial analysis to conservation biology, including the use of species-climate envelope models and land use mapping. Recent work has involved modelling the potential impacts of climate change on African and UK plant species. In other modelling work he has applied a number of reserve modelling and selection algorithms to both marine and terrestrial conservation problems. Work has been cited in the Royal Commission on Environmental Pollution marine fisheries report, the Stern Review, and recent IPCC reports.

**Linda Pardo** is a biogeochemist with the Northern Research Station of the USDA Forest Service in Burlington, VT. Her research focuses on nitrogen cycling in temperate forest ecosystems, particularly in response to anthropogenic disturbance. Much of her field research on N cycling has focused on developing and applying stable isotope methods in order to utilize  $^{15}\text{N}$  to interpret prior disturbances to the N cycle. She has participated in numerous critical loads assessments, primarily in the eastern US, including a site-specific analysis of SSMB critical loads for acidity for New England that was part of the New England Governors'/Eastern Canadian Premiers' Acid Rain Task Force initiative. Most recently, she lead an assessment of empirical critical loads for nitrogen for ecoregions of the US.

**Maximilian Posch** holds a Ph.D. in Physics and a Masters degree in Mathematics from the Technical University of Vienna and worked from 1981-89 at the International Institute for Applied Systems Analysis (IIASA) in Laxenburg (Austria) on the integrated assessment of acidification in Europe (the RAINS model). 1990-1994 he worked at the Finnish Water and Environment Research Institute in Helsinki on the environmental impacts of acid deposition and agricultural practices. Since 1995 he is senior researcher at the Coordination Centre for Effects (CCE) at the Dutch National Institute for Public Health and the Environment (RIVM), since 2006 the Netherlands Environmental Assessment Agency (PBL).



**Gavin Simpson** is a Research Associate, based in the Environmental Change Research Centre, part of the Department of Geography, UCL. He is a limnologist with a focus on remote, oligotrophic lakes and streams. His research combines an understanding of contemporary processes and ecology with palaeoecological data from sediment cores to investigate how lakes have responded to anthropogenic pressures over the past few hundred years. His current research centres on the impact of nitrogen deposition on nutrient poor lakes in the UK and the Arctic, and utilises novel isotope tracer techniques, nutrient bioassays, and isotope measurements on sediment cores samples to investigate biogeochemical process associated with the transport to, and processing of nitrogen in catchments, lakes and streams, and whether these are changing in response to elevated nitrogen deposition.

**Till Spranger** - Federal Ministry of the Environment, Nature Conservation and Nuclear Safety, Section: Regional Air Pollution, Berlin, Germany  
Main activities in the past few years on  
International air pollution policy assessment and development  
Atmospheric deposition and climate change effects on ecosystems and their biodiversity, including development and use of critical loads  
Integrated nitrogen assessment and policy development  
Selected functions  
German delegate to the Working Group on Strategies and Review and Executive Body of the UNECE Convention on Long-range Transboundary Air Pollution (*since mid-2009*)  
Chairman, Internat'l Coop. Programme on Modelling and Mapping Critical Loads & Levels and Air Pollution Effects, Risks and Trends (ICP M&M) (*until end-2009*)  
Member of Advisory Groups of the European Nitrogen Assessment, NitroEurope IP et al.  
Education  
Ph.D. in ecosystem research (air pollution, biogeochemistry), Univ. Kiel, Germany  
M.S. Environmental Science, Indiana University, Bloomington, IN, USA



**Carly Stevens** - I am currently working as a Leverhulme research fellow jointly between the Open University (UK) and Lancaster University (UK) where my research focuses on the impact of nitrogen deposition on semi-natural habitats. My particular interests are associated with plant community composition and species richness responses to nitrogen deposition, the changes in the soil that might be related to the changes seen in the plant community and what might make good indicators of nitrogen deposition. I am currently working as part of the European Science Foundation project 'Biodiversity of European Grasslands – Impact of nitrogen deposition (BEGIN)' and the Leverhulme Trust funded project 'Interactive effects of nitrogen deposition and climate change'. I am also working on a number of other smaller related to nitrogen deposition impacts, recovery from nitrogen deposition and global change.



**Mark Sutton** is a research scientist at the UK Centre for Ecology and Hydrology (CEH) in Edinburgh. His research focuses on the emission, atmospheric chemistry, deposition and environmental impacts of ammonia and other nitrogen compounds in the environment. He is currently coordinator of the European Commission integrated project NitroEurope which is addressing the influence of nitrogen on the European greenhouse gas balance. Mark is one of the co-chairs of the Task Force on Reactive Nitrogen, a body under the UN-ECE Convention on Long-range Transboundary Air Pollution (LRTAP). He is a contributor to the Nitrogen in Europe (NinE) and is leading the preparation of the European Nitrogen Assessment. He is a member of the scientific steering committee of INI representing its European Centre.

**Harald Sverdrup**, Professor of Chemical Engineering at Lund University since 1994. 55 years young, carnivore and reader of ancient literature. 25 years of experience with critical loads, and development of integrated dynamic models for complex ecological systems. PROFILE, SAFE, KALK, HELGE, LANGUAGE, FarmFLOW, TOXEN, BigMERK, ForSAFE, ForSAFE-VEG. At present focusing on integrated sustainability assessments and is using biogeochemical models to drive biodiversity models.



**Robert Vet** is a physical scientist with the Air Quality Research Division of Environment Canada. He has carried out research in the fields of precipitation chemistry, wet and dry deposition, and air pollution for over 30 years. He has a M.A.Sc. degree from the University of Waterloo (Canada) and has authored/coauthored over 40 peer-reviewed publications and a number of national atmospheric science assessments. He is a member of the World Meteorological Organization Scientific Advisory Group for Precipitation Chemistry and is currently the lead author on the World Meteorological Organization's Global Precipitation Chemistry and Deposition Assessment.

**Wim de Vries** was born on April 15, 1959 in The Netherlands in a small village called Kinderdijk, that is famous for his 19 windmills, being put on the UNESCO list. He studied soil physics and soil chemistry at Wageningen University from 1977-1983. He gained a Ph. D degree (Cum laude) at this university with a thesis entitled 'Soil response to acid deposition at different regional scales'. He is a scientist in the field of soil chemistry with special reference to soil acidification, nutrient cycling, green house gas emissions and heavy metal pollution. He has a leading role in the field of the assessment critical loads for nitrogen, sulphur and heavy metals on terrestrial ecosystems. His specific expertise is related to the development and application of soil models in combination with field and laboratory research.



**James Williams** - The Joint Nature Conservation Committee is a statutory advisor to the United Kingdom Government on UK wide and International conservation issues. I've worked for JNCC and Scottish Natural Heritage since 1991. My experience in international reporting work includes writing or contributing to the last three UK reports for each of the Convention on Biological Diversity, Ramsar Convention on Wetlands of International Importance, and the Convention on Migratory Species. I've also co-ordinated UK reports for the EU Habitats and Birds Directives since 1999. I lead JNCC's work on biodiversity indicators, and have worked closely with Government and others to develop and publish the UK suite of indicators ([www.jncc.gov.uk/biyp](http://www.jncc.gov.uk/biyp)). I've also been involved in the development of European biodiversity indicators by chairing two of the working groups under the SEBI2010 initiative.

**Sarah Woodin** - My research interests are in the effects of drivers of change on native plant species, vegetation communities and ecosystem processes in the British uplands and the Arctic. I am involved in projects investigating ecological impacts of atmospheric nitrogen deposition, climate change, herbivory, and land management practices. The impacts studied range from the ecophysiology of individual species, through vegetation processes and inter-trophic interactions to ecosystem nutrient and carbon dynamics, and a common theme is the functional importance, and sensitivity, of bryophytes within the ecosystem. We have demonstrated sensitivity of arctic heath vegetation to very low nitrogen inputs, helping to establish the critical load for the system, and a lack of ecosystem recovery following cessation of nitrogen inputs. In the UK, large scale surveys and field experiments are underway to investigate the relationship between nitrogen deposition (and other drivers) and the condition of mountain vegetation.

